Amazon Managed Streaming for Apache Kafka (Amazon MSK)

Table of Contents

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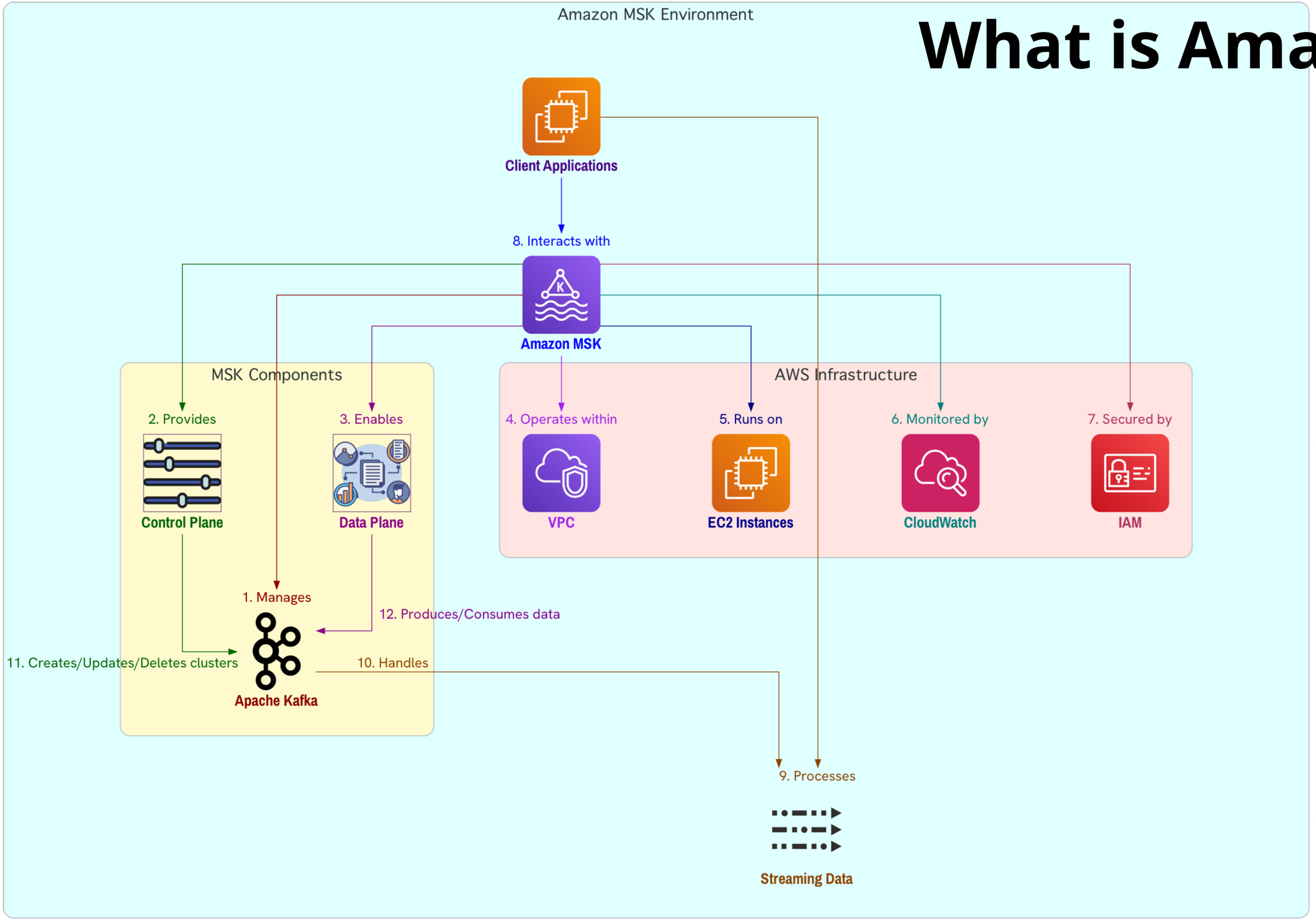
1. What is Amazon MSK?
2. Architecture of Amazon MSK
3. KRaft Mode
4. Tiered Storage
5. Tiered Storage: Features and Benefits
6. MSK Serverless
7. What is MSK Connect?

What is Amazon MSK?



1️⃣. 🌐 Fully managed service for Apache Kafka

🏗️ Build and run Kafka applications

🔧 AWS handles cluster maintenance

🎯 Focus on application development

2️⃣. 🔄 Process streaming data

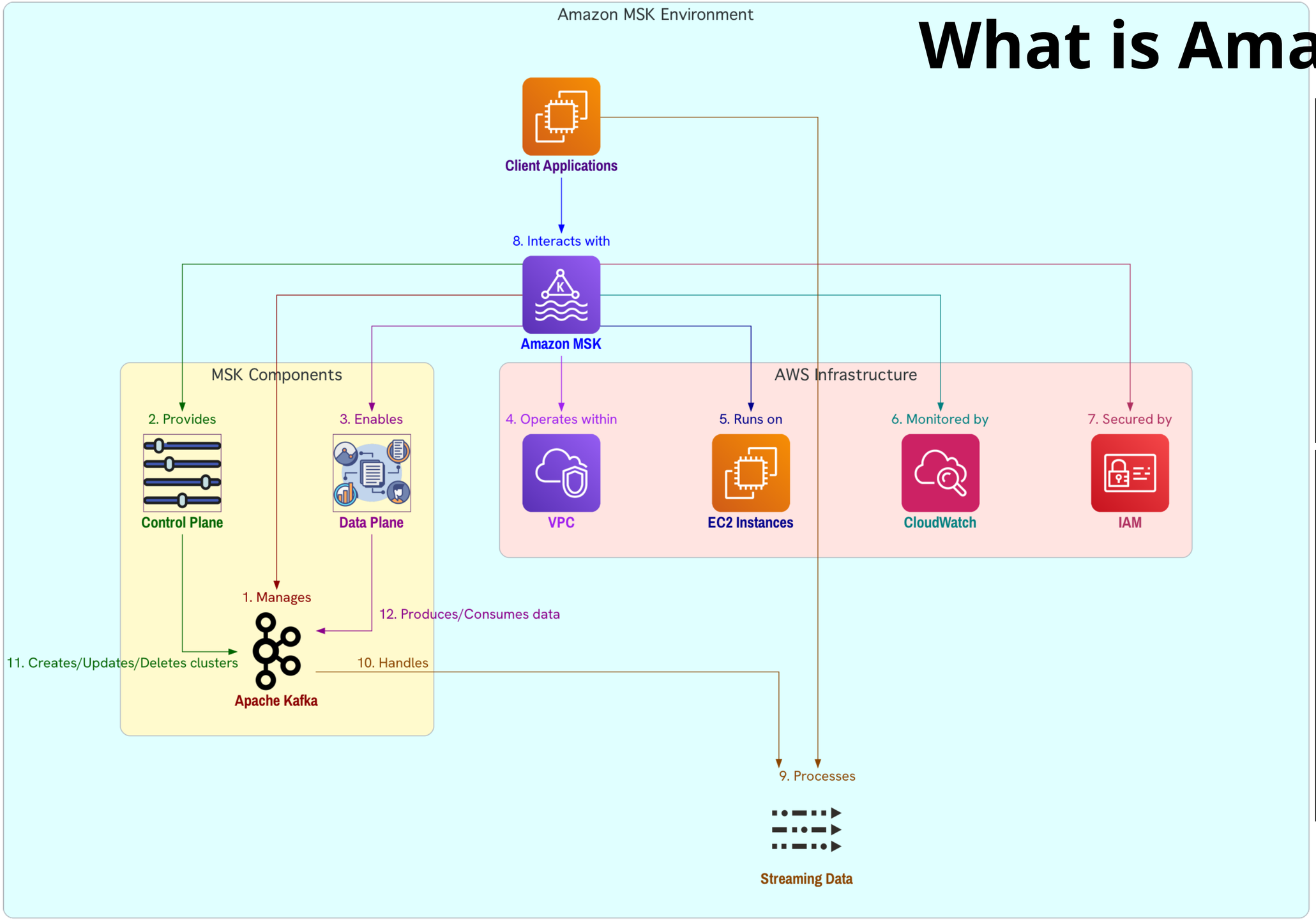
📊 Real-time data processing

📝 Log analytics

🤹 Event-driven applications

📈 Real-time dashboards

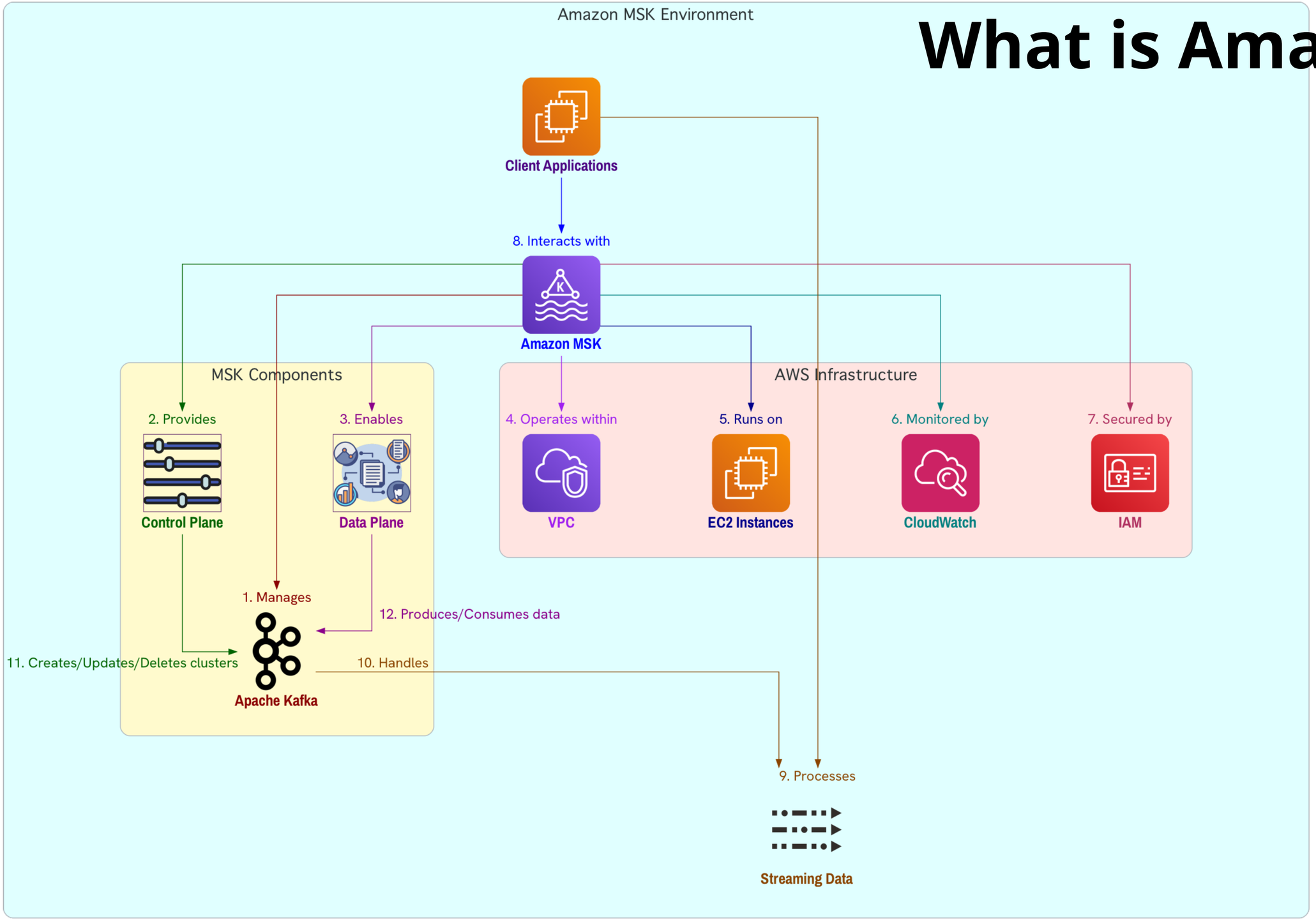
What is Amazon MSK?



3️⃣. 🎛️ Control-plane operations
➕ Create clusters
🔄 Update clusters
➖ Delete clusters
🔧 Reduces operational overhead

4️⃣. 🔍 Data-plane operations
📤 Produce data
📥 Consume data
🛠️ Use familiar Kafka APIs and tools
🎮 Full control over data processing logic

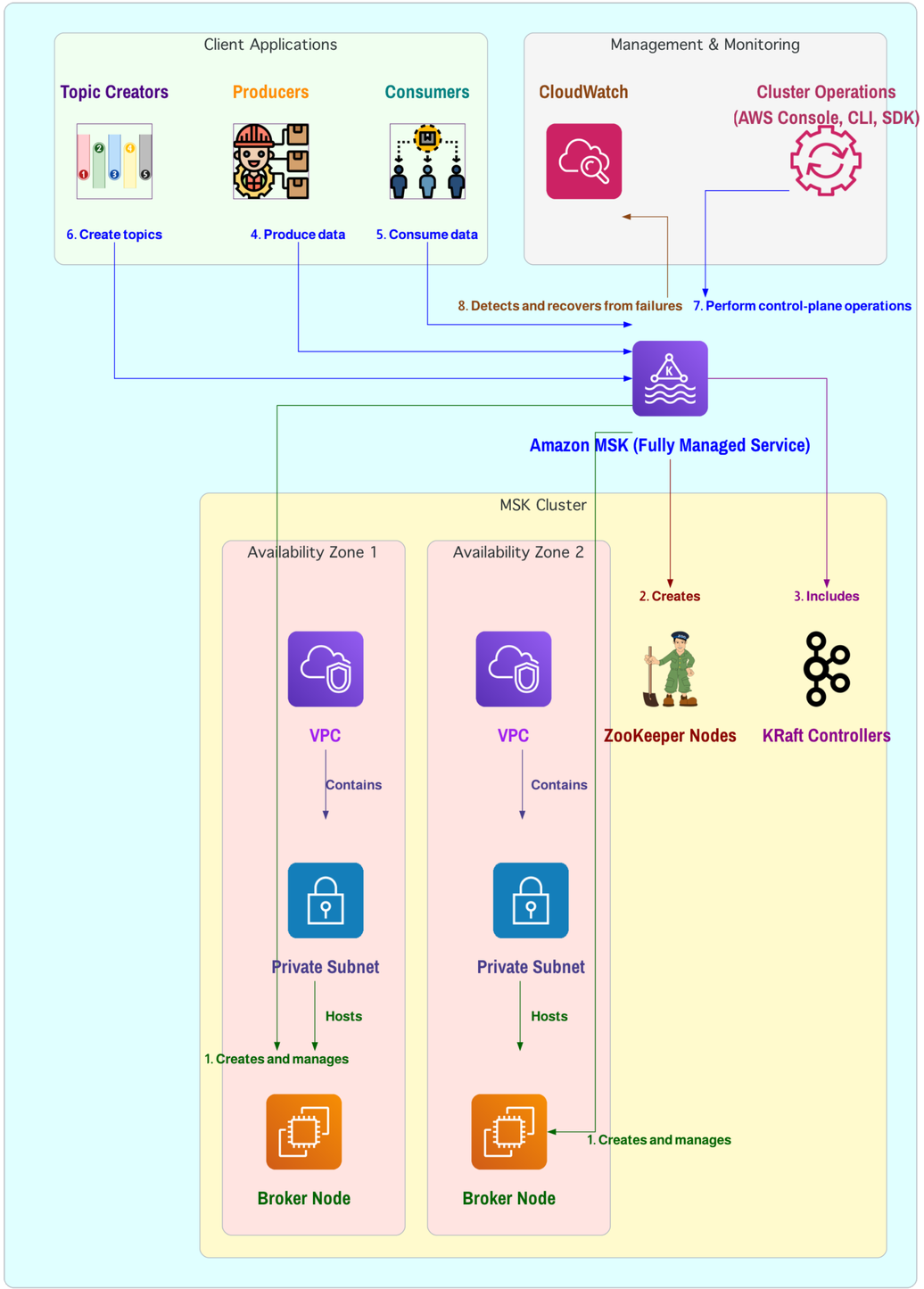
What is Amazon MSK?



5️⃣. ⭐ Runs open-source Apache Kafka versions
🔗 Ensures compatibility
🆕 Access to latest features
🛠️ Leverage community improvements

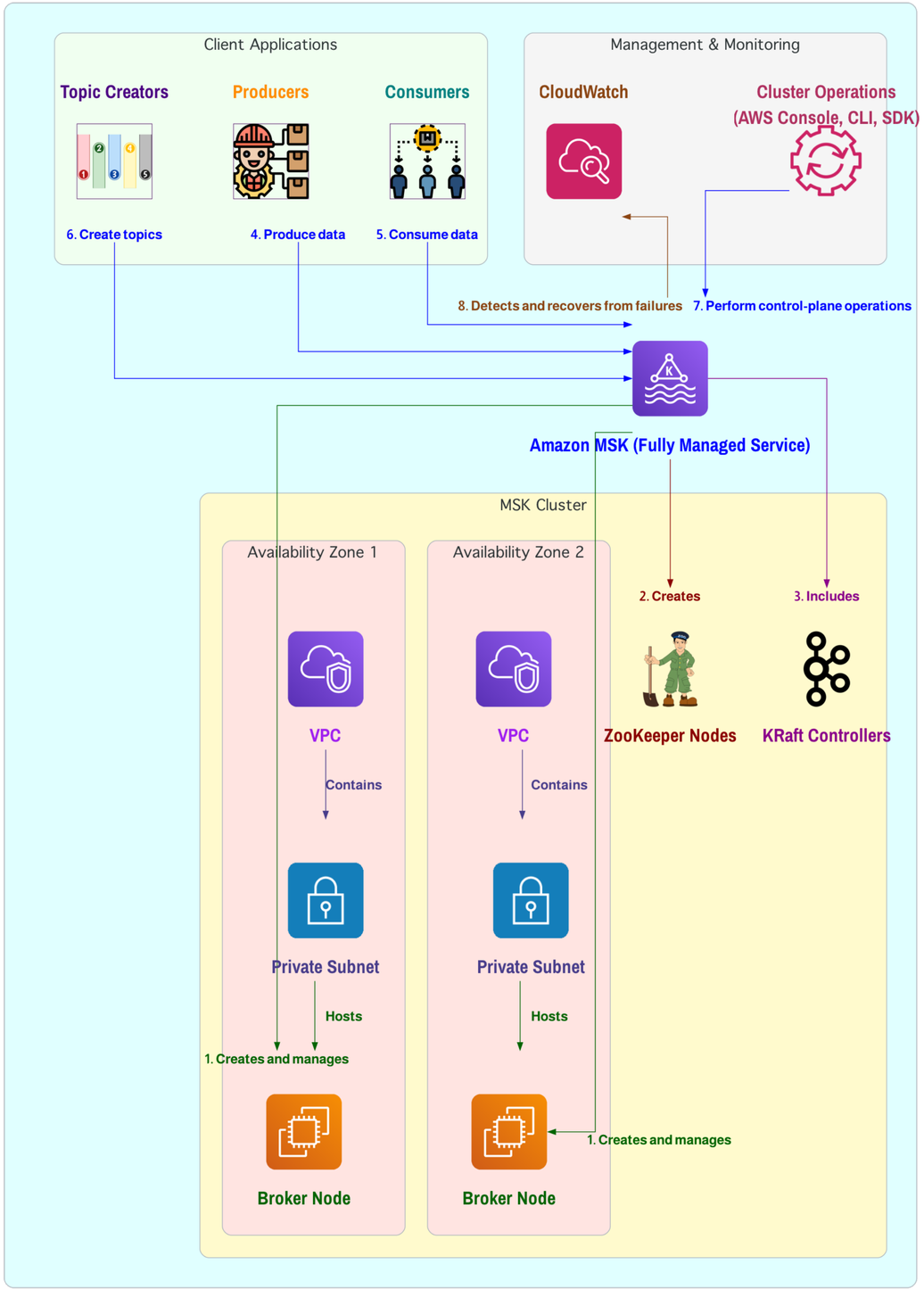
6️⃣. 🔌 Supports existing ecosystem
📱 Existing applications
🔧 Tooling
🧩 Plugins
🚫 No code changes required
⏱️ Saves migration time
📉 Reduces migration risks

Architecture of Amazon MSK



1️⃣. 🖥️ Broker nodes: Distributed across Availability Zones	2️⃣. 🔗 ZooKeeper nodes: Reliable distributed coordination	3️⃣. 🔄 KRaft controllers: Metadata management alternative
🔢 Specify number of nodes per zone	🤖 Automatically created by MSK	🔁 Replaces ZooKeeper for metadata management
🔀 Minimum one broker per zone	📊 Manages configuration and synchronization	🧠 Manages metadata within Kafka cluster
🌐 Each zone has own VPC subnet	🔄 Open-source coordination server	💰 No additional cost
🔐 Ensures high availability and fault tolerance		🛠️ No extra setup or management needed

Architecture of Amazon MSK



4️⃣. 👥 Client applications: Producers, consumers, topic creators
📩 Produce data to topics
📩 Consume data from topics
📝 Create topics
🔌 Uses standard Kafka APIs and tools
🔗 Seamless integration with existing applications

5️⃣. 🎛️ Cluster operations: Control-plane management
🖥️ AWS Management Console
⌨️ AWS CLI
🧰 SDK APIs
➕ Create clusters
➖ Delete clusters
📋 List clusters
🔍 View cluster properties
🔄 Update broker number and type

6️⃣. 🛡️ Fault tolerance: Automatic failure detection and recovery
🚨 Detects common failure scenarios
🔧 Mitigates or replaces unhealthy brokers
💾 Reuses storage to minimize data replication
⏱️ Limits downtime
🔄 Maintains same broker IP addresses after recovery

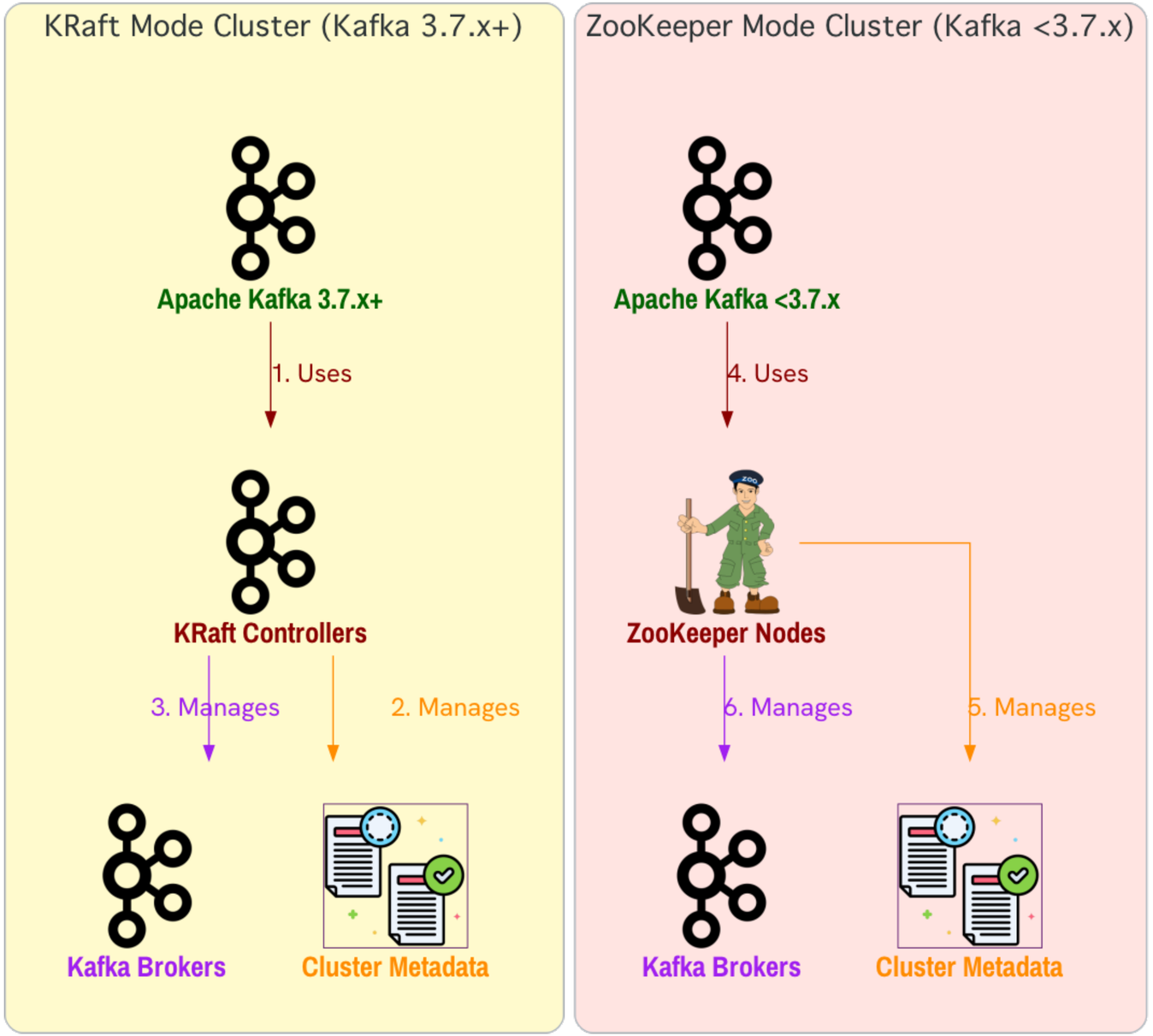
KRaft Mode

1️⃣. 🔄 KRaft mode introduction

- 📅 Introduced in Kafka 3.7.x
- 🔁 Replaces Apache ZooKeeper
- 📊 Metadata management within Kafka cluster
- 💰 No additional cost
- 🛠️ No additional setup or management

2️⃣. 🆕 Availability

- 🏗️ Only for new clusters
- 🔒 No switching after creation



Amazon MSK: KRaft vs ZooKeeper Mode

3️⃣. 🖥️ Cluster creation

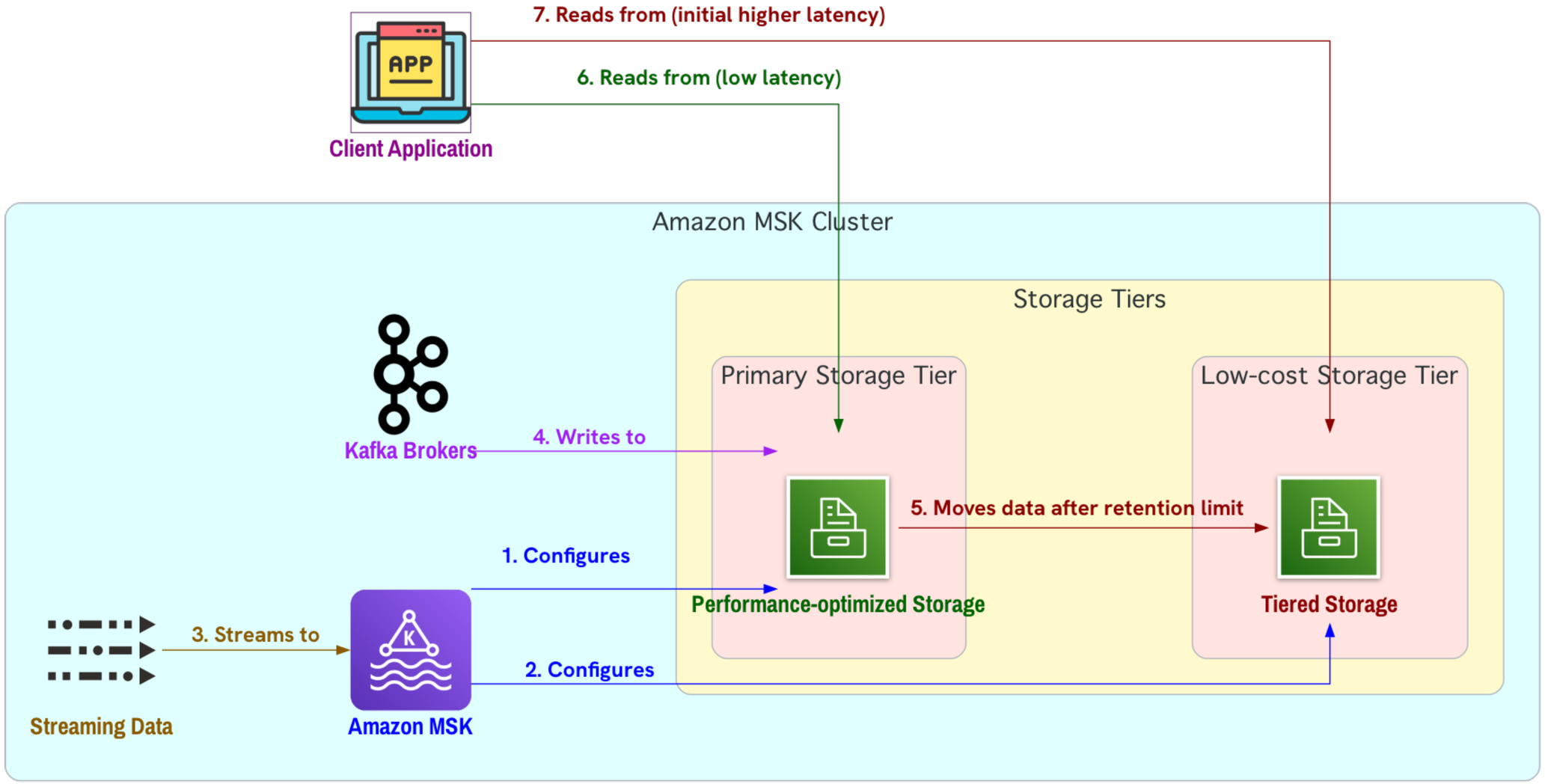
- 🎛️ MSK console
- ✅ Select Kafka 3.7.x
- ☑️ Check KRaft checkbox

4️⃣. 📊 Partition capacity

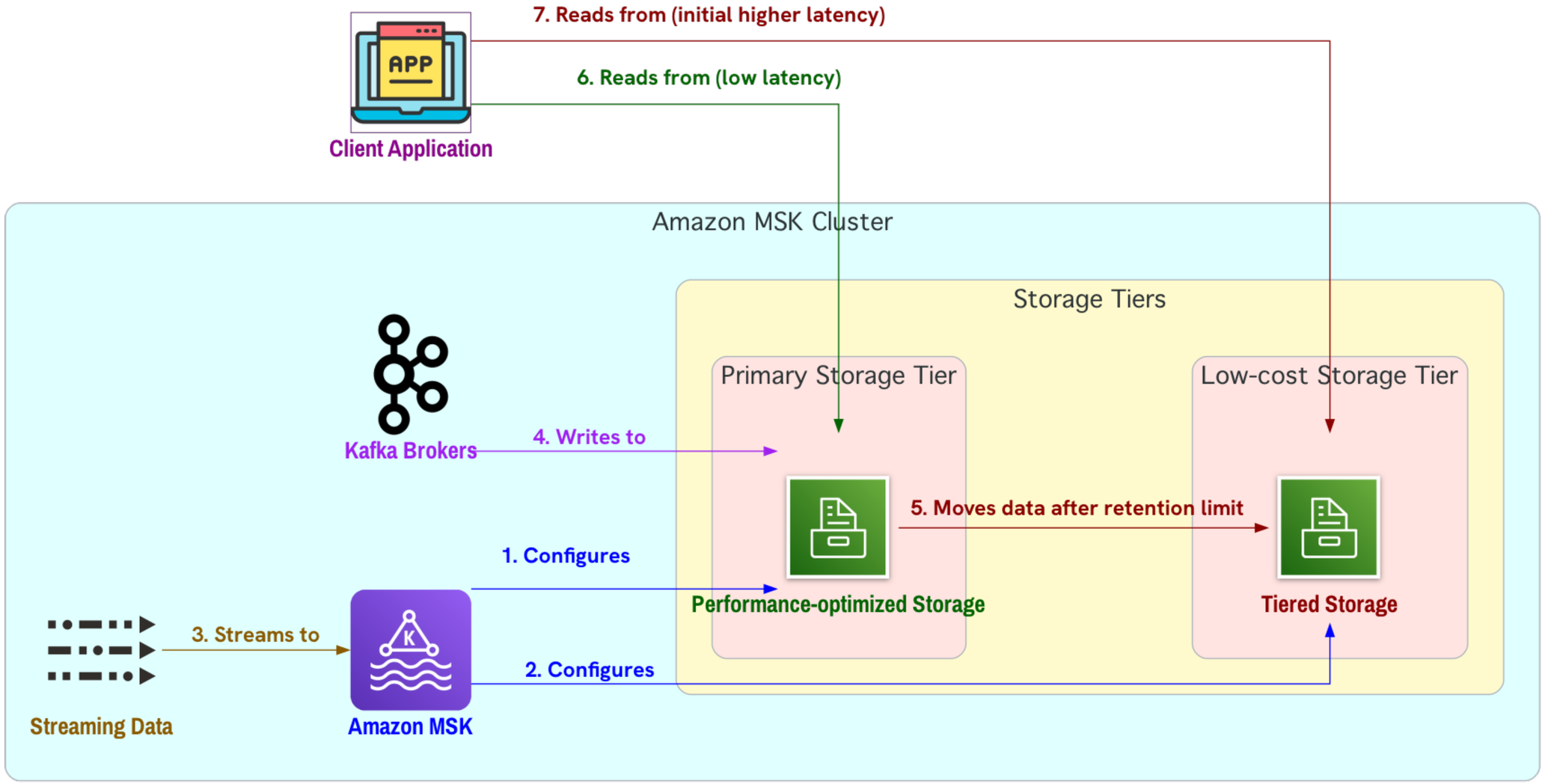
- 🔢 Same partitions per broker
- 📈 More partitions per cluster
- 🔌 Provision more brokers

5️⃣. 🗄️ Metadata storage and access control

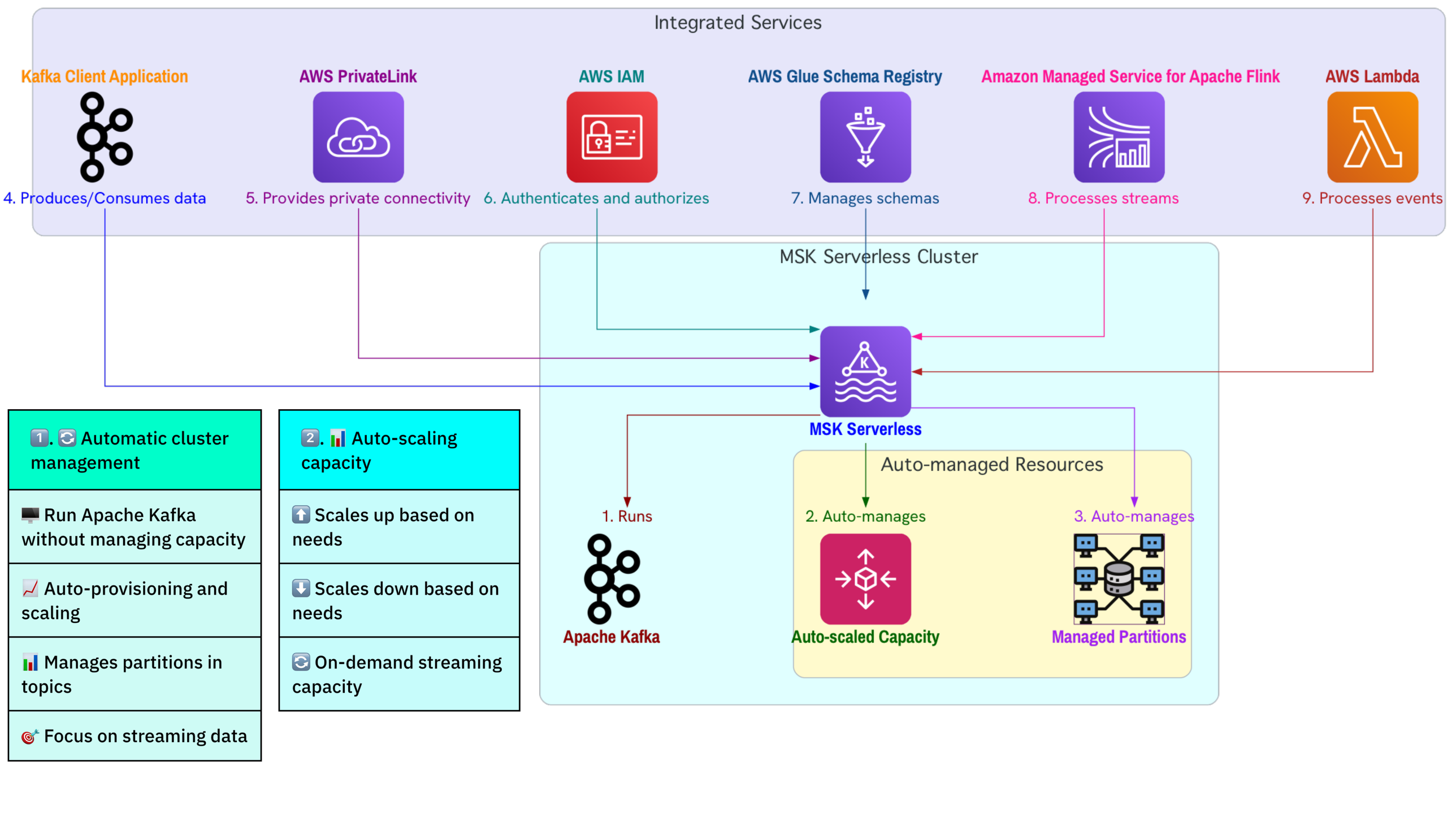
- 💾 Stored on KRaft controllers
- 🔐 Simplified access control
- 🚫 No separate controller node access

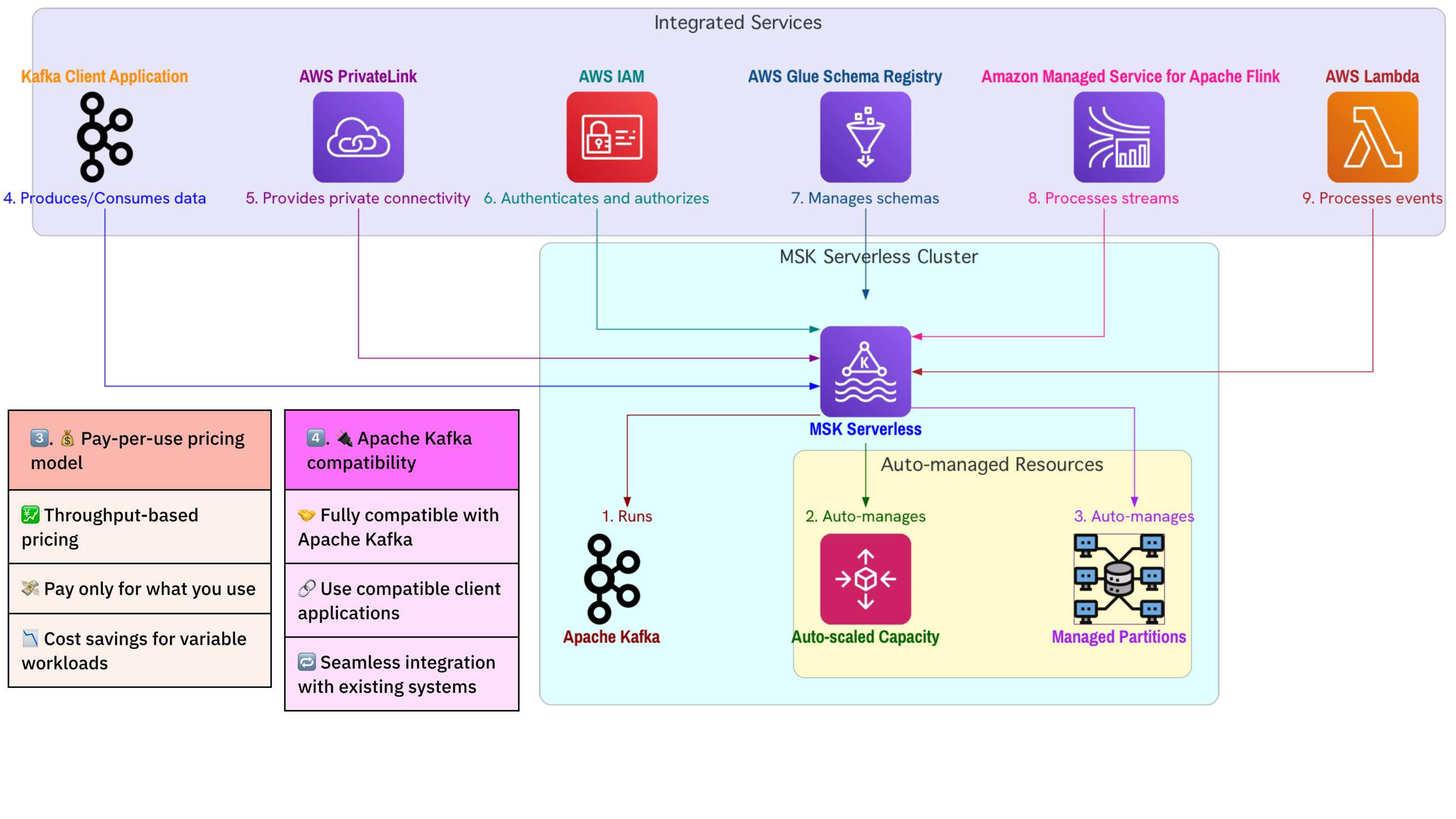


1. 💰 **Low-cost, scalable storage solution**: 📈 Scales to unlimited storage, 💻 Cost-effective for streaming apps
2. 🚀 **Balances performance and cost**: ⚖️ Optimizes streaming infrastructure, 🔧 Configurable MSK clusters
3. 📊 **Two-tier storage system**: 🏎️ Performance-optimized primary tier, 🚚 Low-cost secondary tier, 🔄 Automatic data movement
4. 🔄 **Automatic data movement**: ⏱️ Based on retention limits, 🤖 Reduces manual intervention, 📉 Lowers management overhead
5. 📉 **Initial latency increase, then similar performance**: ⏳ Higher latency for first few bytes, 🏃 Similar latency for sequential reads
6. 💳 **Pay-per-use model**: 🚫 No storage provisioning needed, 💾 Store any amount of data, 💸 Pay only for what you use



1. 🌐 **Virtually unlimited scalability**: 📈 Scales to unlimited storage, 🧠 No guesswork for infrastructure scaling, 🚀 Flexible for growing data needs
2. 🕰️ **Longer data retention**: 📚 Extended data storage in Kafka topics, 🖥️ No need to increase brokers, 💰 Historical analysis without added costs
3. 🛡️ **Extended safety buffer**: ⏳ Handles unexpected processing delays, 🔨 Enhances system resilience, 🔧 Manages unforeseen issues
4. 🔄 **Reprocess old data easily**: 🔄 Maintains production order, 🧰 Uses existing processing code and APIs, 🔍 Enables consistent historical analysis
5. ⚡ **Faster partition rebalancing**: 🏎️ Quicker rebalancing process, 💾 No replication across broker disks, 🔥 Improved performance during maintenance
6. 🔒 **Secure data transfer within VPC**: 🔐 Data moves within VPC, 🚫 No internet transfer, ⚡ Reduced potential latency
7. 🔌 **Seamless client connectivity**: 🔄 Same connection process, 👍 Backward compatibility, 😊 Easy adoption


Integrated Services
Kafka Client Application
AWS PrivateLink
AWS IAM
AWS Glue Schema Registry
Amazon Managed Service for Apache Flink
AWS Lambda
4. Produces/Consumes data
5. Provides private connectivity
6. Authenticates and authorizes
7. Manages schemas
8. Processes streams
9. Processes events
MSK Serverless Cluster
MSK Serverless
Auto-managed Resources
1. Runs
Apache Kafka
2. Auto-manages
Auto-scaled Capacity
3. Auto-manages
Managed Partitions
1️⃣. 🔄 Automatic cluster management
🖥️ Run Apache Kafka without managing capacity
📈 Auto-provisioning and scaling
📊 Manages partitions in topics
🎯 Focus on streaming data
2️⃣. 📊 Auto-scaling capacity
⬆️ Scales up based on needs
⬇️ Scales down based on needs
🔄 On-demand streaming capacity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MSK Serverless Cluster
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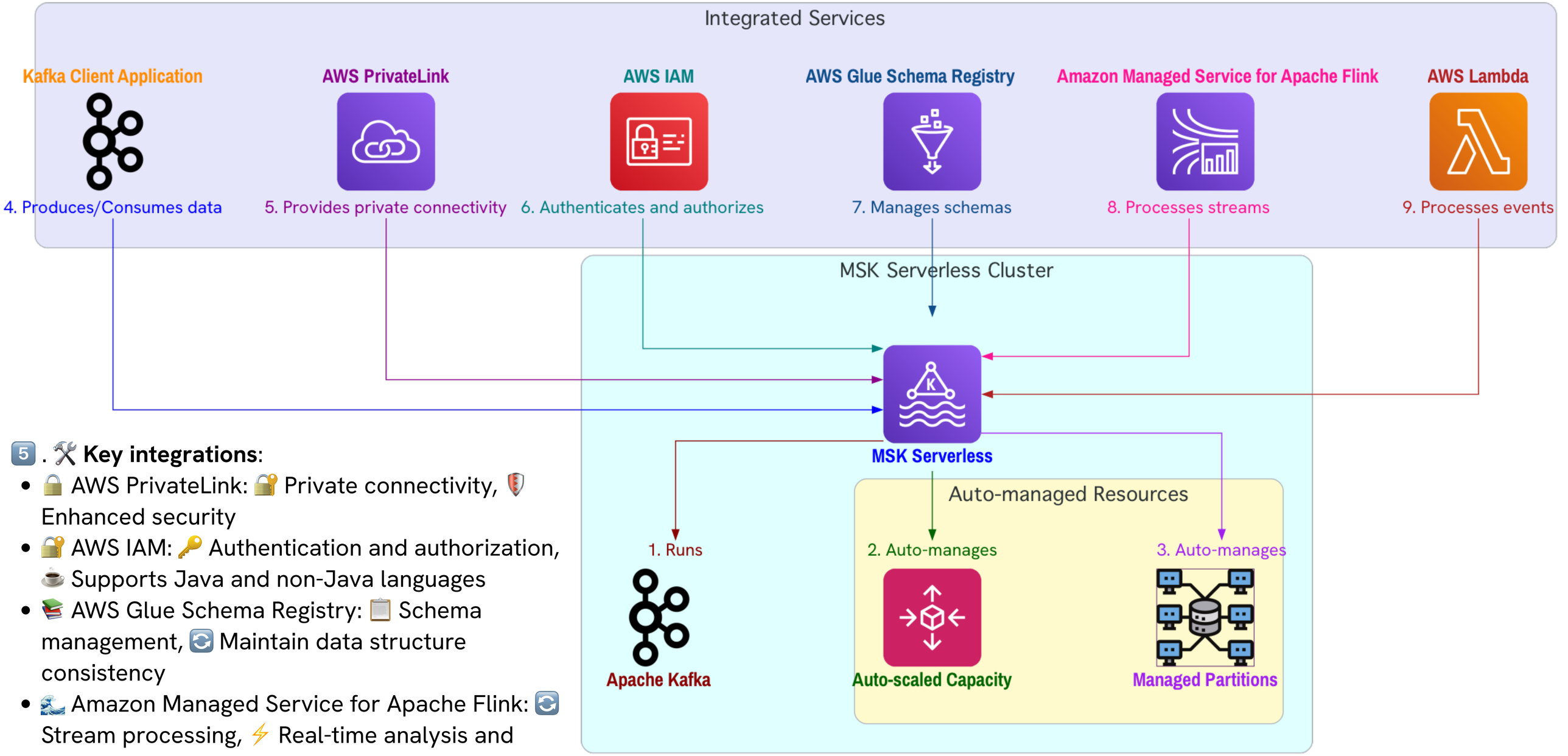
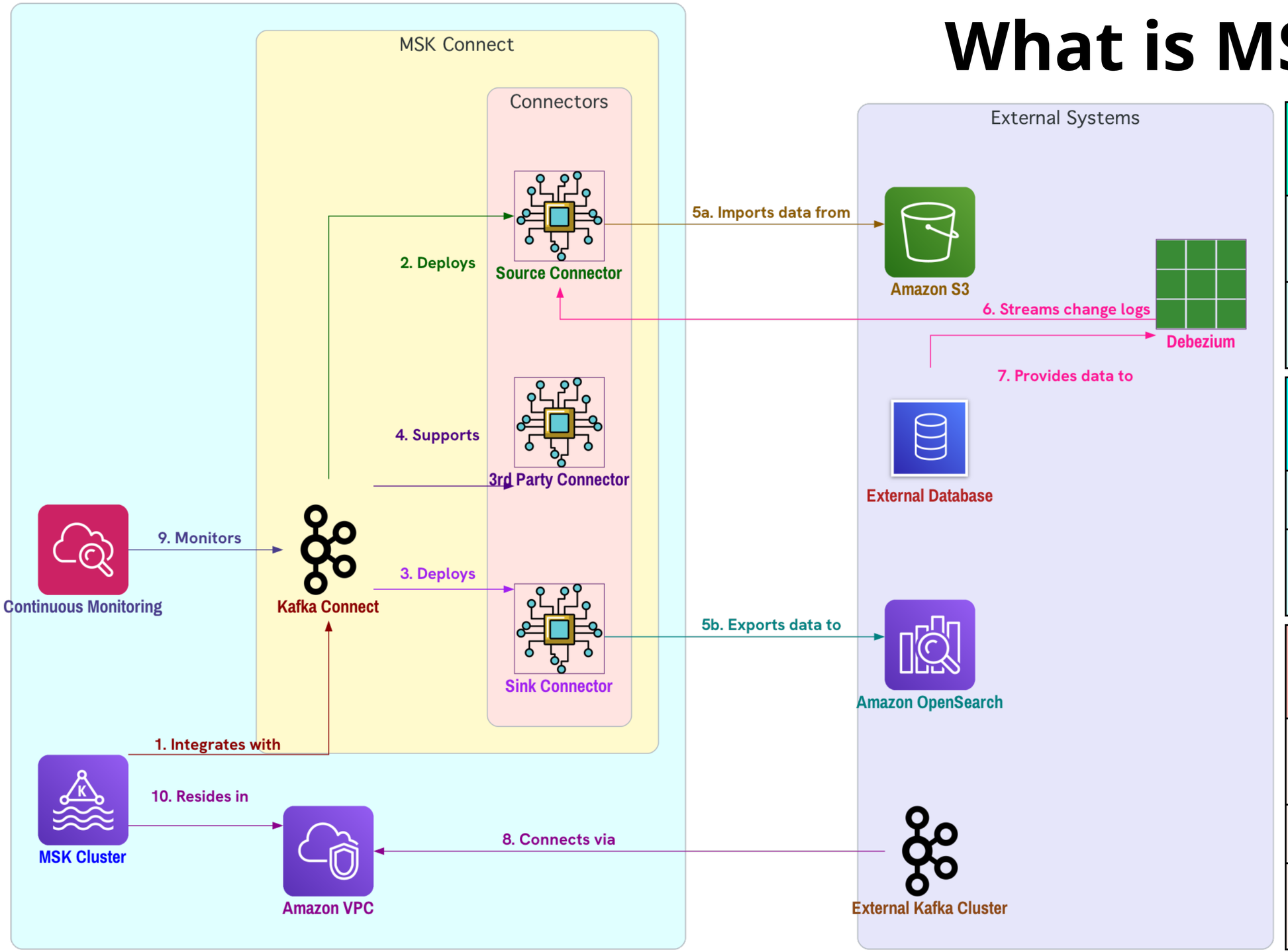
Auto-managed Resources
1. Runs
2. Auto-manages
3. Auto-manages
Apache Kafka
Auto-scaled Capacity
Managed Partitions
3️⃣. 💰 Pay-per-use pricing model
💹 Throughput-based pricing
💸 Pay only for what you use
📉 Cost savings for variable workloads
4️⃣. 🔌 Apache Kafka compatibility
🤝 Fully compatible with Apache Kafka
🔗 Use compatible client applications
🔁 Seamless integration with existing systems



5️⃣ . 🛠️ **Key integrations**:

- 🔒 AWS PrivateLink: 🔐 Private connectivity, 🛡️ Enhanced security
- 🔐 AWS IAM: 🔑 Authentication and authorization, ☕ Supports Java and non-Java languages
- 📚 AWS Glue Schema Registry: 📋 Schema management, 🔄 Maintain data structure consistency
- 🌊 Amazon Managed Service for Apache Flink: 🔄 Stream processing, ⚡ Real-time analysis and action
- λ AWS Lambda: 🎭 Event processing, 🔔 Trigger serverless functions

What is MSK Connect?



1️⃣. 🚀 Easy data streaming for Apache Kafka clusters

🔄 Simplifies data streaming process

👷 User-friendly data flow management

2️⃣. 🔄 Uses Kafka Connect 2.7.1 framework

🔒 Open-source framework

🔌 Connects Kafka with external systems

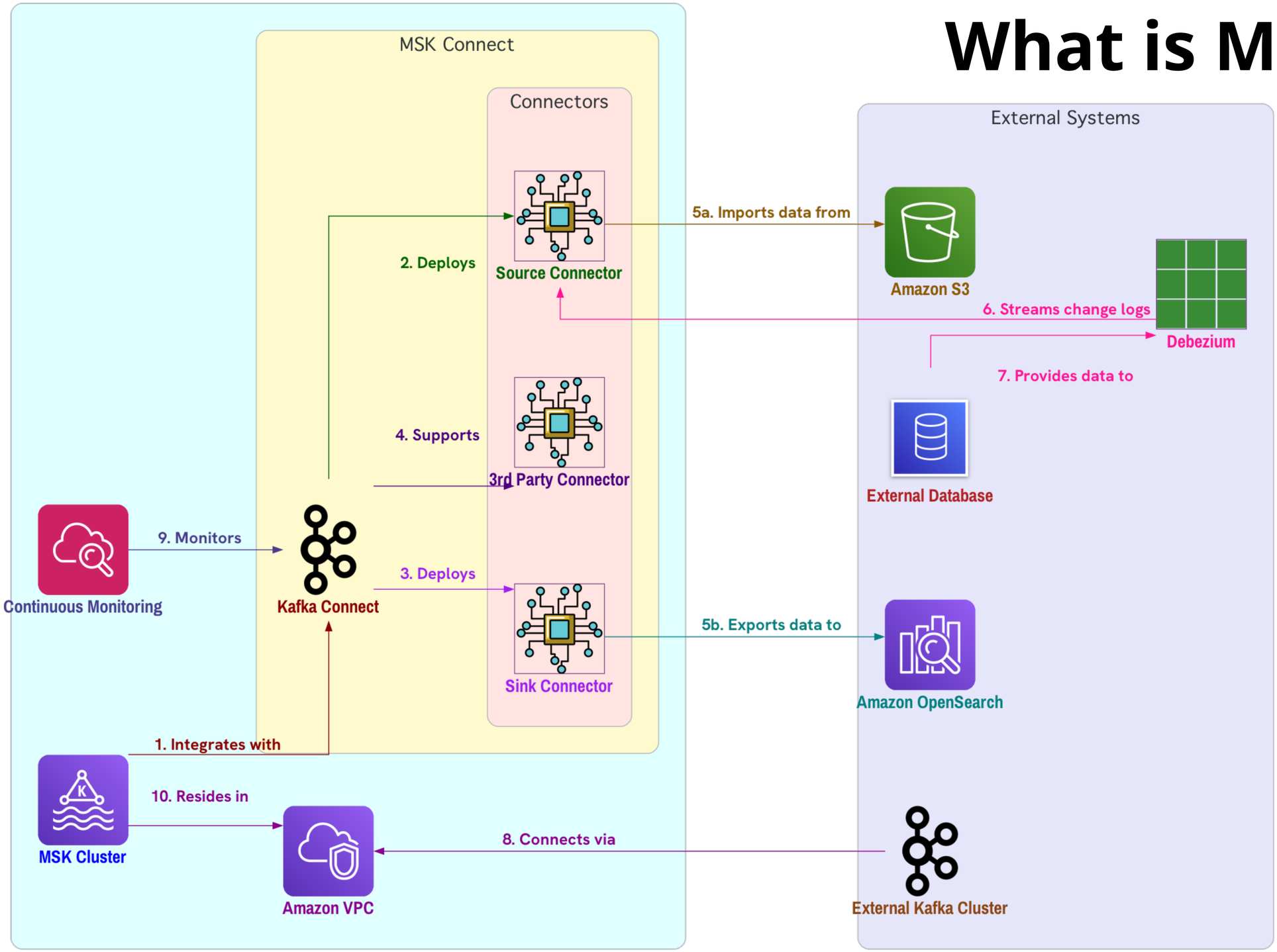
3️⃣. 🔌 Fully managed connectors available

🔁 Move data to/from popular data stores

📦 Amazon S3 integration

🔍 Amazon OpenSearch Service integration

What is MSK Connect?



4️⃣. 📩 Source connectors for data import

🔽 Import data from external systems

🔀 Bring data into Kafka ecosystem

5️⃣. 📩 Sink connectors for data export

🔼 Export data to external systems

📊 Distribute processed data

6️⃣. 🔧 3rd party connector support

🔌 Debezium for change log streaming

♻️ Deploy existing connectors without changes

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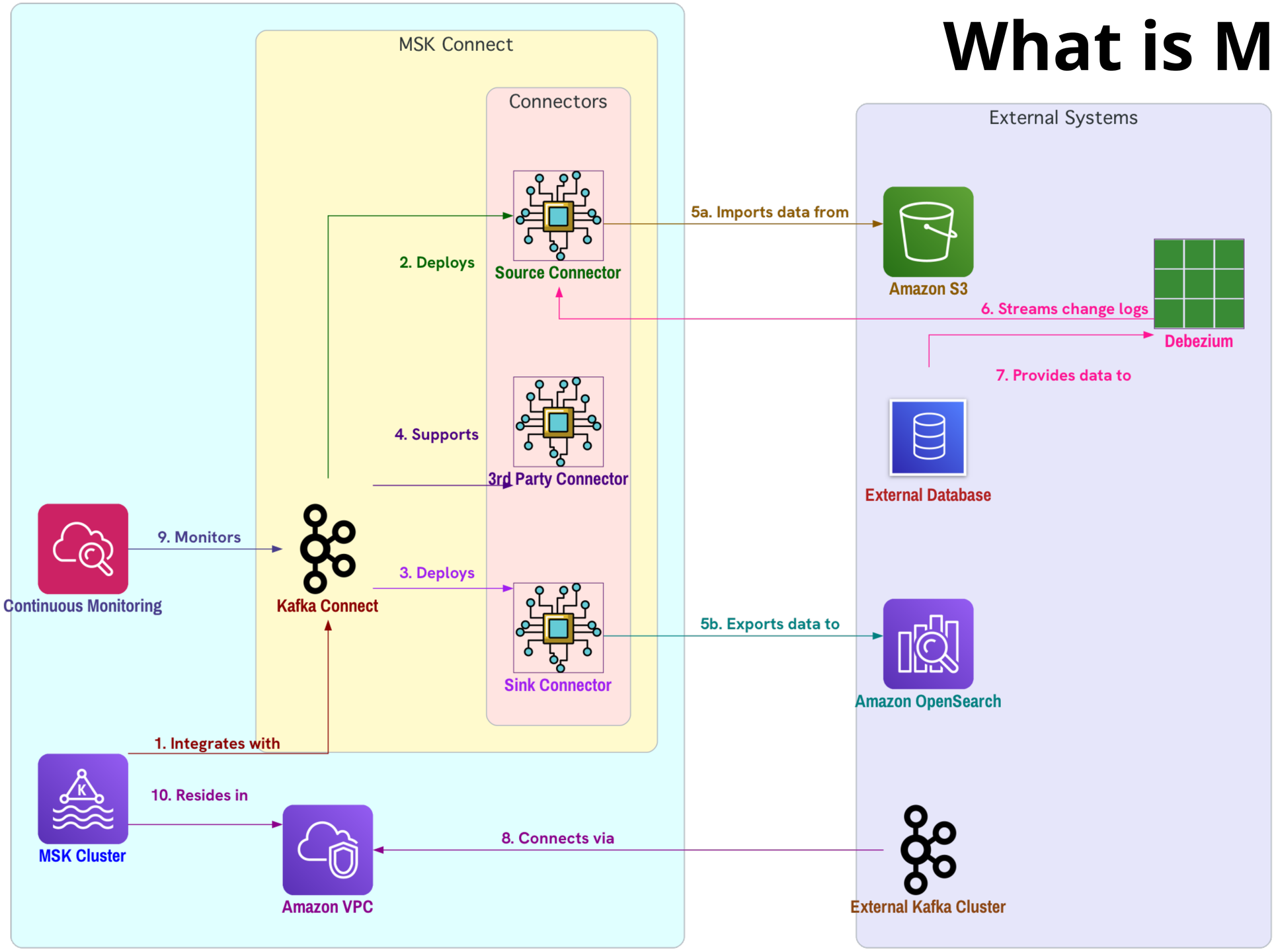

7️⃣. 📊 Automatic scaling and resource management

⚖️ Adjusts for load changes

💰 Pay only for used resources

8️⃣. 🖥️ Supports any Kafka cluster in Amazon VPC

🔗 Works with MSK clusters

🏠 Works with independently hosted clusters

9️⃣. 🔍 Continuous monitoring and maintenance

🏥 Monitors connector health

🔧 Handles patching and hardware management

🚀 Reduces operational burden

Thanks for Watching