Apache Flume

Data Collection System

Agenda

- Overview of Flume
- Flume Sources
- Channels & Sinks
- Flume Topology
- Production Architecture
- Monitoring & Performance

Overview of Flume

- Collection, Aggregation of streaming Event Data
  - Typically used for log data
- Significant advantages over ad-hoc solutions
  - Reliable, Scalable, Manageable, Customizable and High Performance
  - Declarative, Dynamic Configuration
  - Contextual Routing
  - Feature rich
  - Fully extensible

Core Concepts: Event

An Event is the fundamental unit of data transported by Flume from its point of origination to its final destination. Event is a byte array payload accompanied by optional headers.

- Payload is opaque to Flume
- Headers are specified as an unordered collection of string key-value pairs, with keys being unique across the collection
- Headers can be used for contextual routing

Core Concepts: Client

An entity that generates events and sends them to one or more Agents.

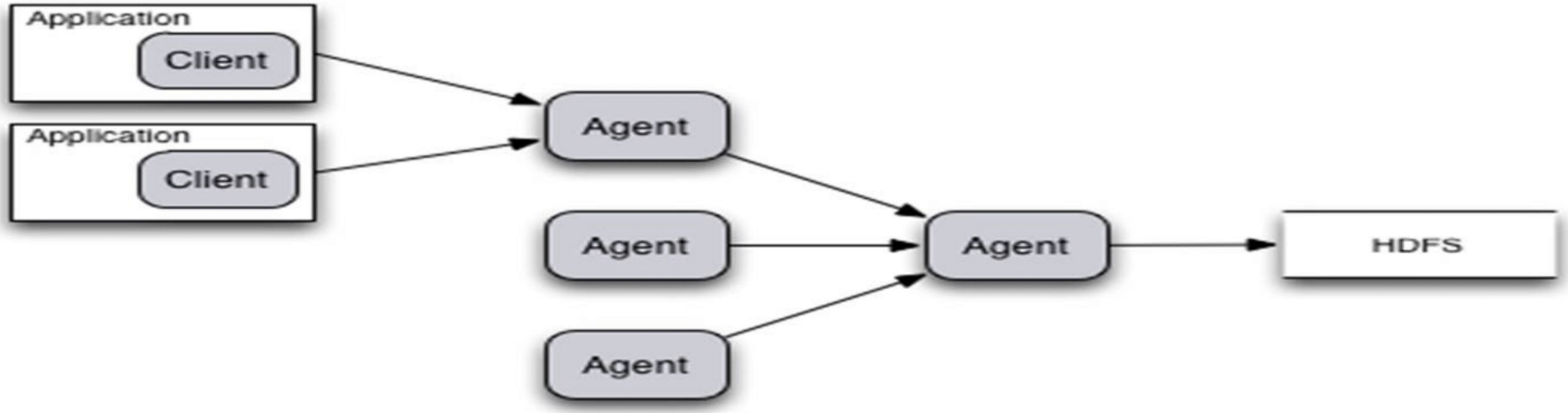
- Example
  - Flume log4j Appender
  - Custom Client using Client SDK (org.apache.flume.api)
- Decouples Flume from the system where event data is consumed from
- Not needed in all cases

Core Concepts: Agent

A container for hosting Sources, Channels, Sinks and other components that enable the transportation of events from one place to another.

- Fundamental part of a Flume flow
- Provides Configuration, Life-Cycle Management, and Monitoring Support for hosted components

Typical Aggregation Flow



[Client]$^{+}$ → Agent [→ Agent]* → Destination

Core Concepts: Source

An active component that receives events from a specialized location or mechanism and places it on one or Channels.

- Different Source types:
  - Specialized sources for integrating with well-known systems. Example: Syslog, Netcat
  - Auto-Generating Sources: Exec, SEQ
  - IPC sources for Agent-to-Agent communication: Avro
- Require at least one channel to function

Source

- Reads data from the source system and passes onto the next hop or to the final destination.
- Flume Sources:
  - Avro Source
  - Exec Source
  - JMS Source
  - Spooling Directory Source

Core Concepts: Channel

A passive component that buffers the incoming events until they are drained by Sinks.

- Different Channels offer different levels of persistence:
  - Memory Channel: volatile
  - File Channel: backed by WAL implementation
  - JDBC Channel: backed by embedded Database
- Channels are fully transactional
- Provide weak ordering guarantees
- Can work with any number of Sources and Sinks.

Core Concepts: Sink

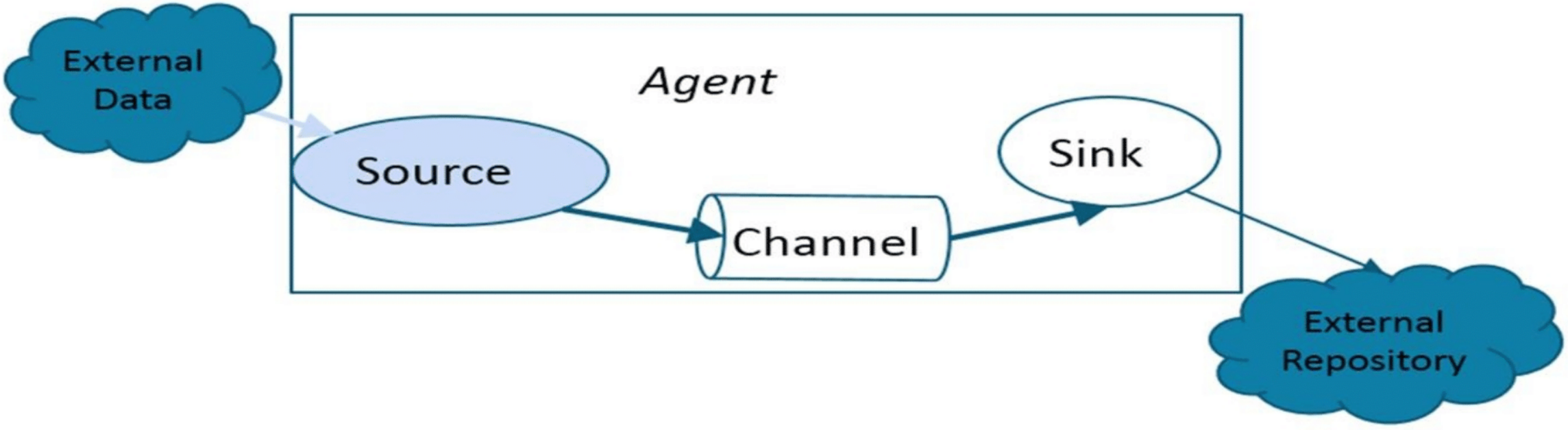
An active component that removes events from a Channel and transmits them to their next hop destination.

- Different types of Sinks:
  - Terminal sinks that deposit events to their final destination. For example: HDFS, HBase
  - IPC sink for Agent-to-Agent communication: Avro
- Require exactly one channel to function

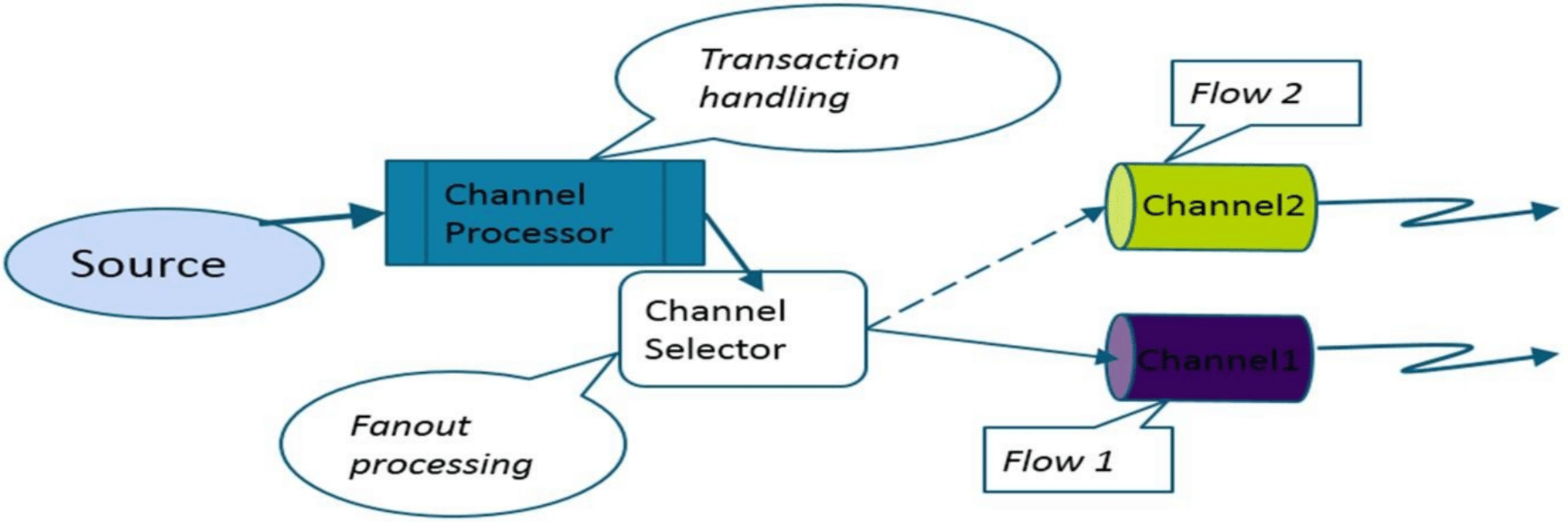
Sinks

- Writes data to the next hop or to the final destination.
- Flume Sinks:
  - Avro Sink
  - HDFS Sink
  - HBASE Sink
  - File Sink
  - Null Sink
  - Logger Sink

What is the source in Flume



Fanout



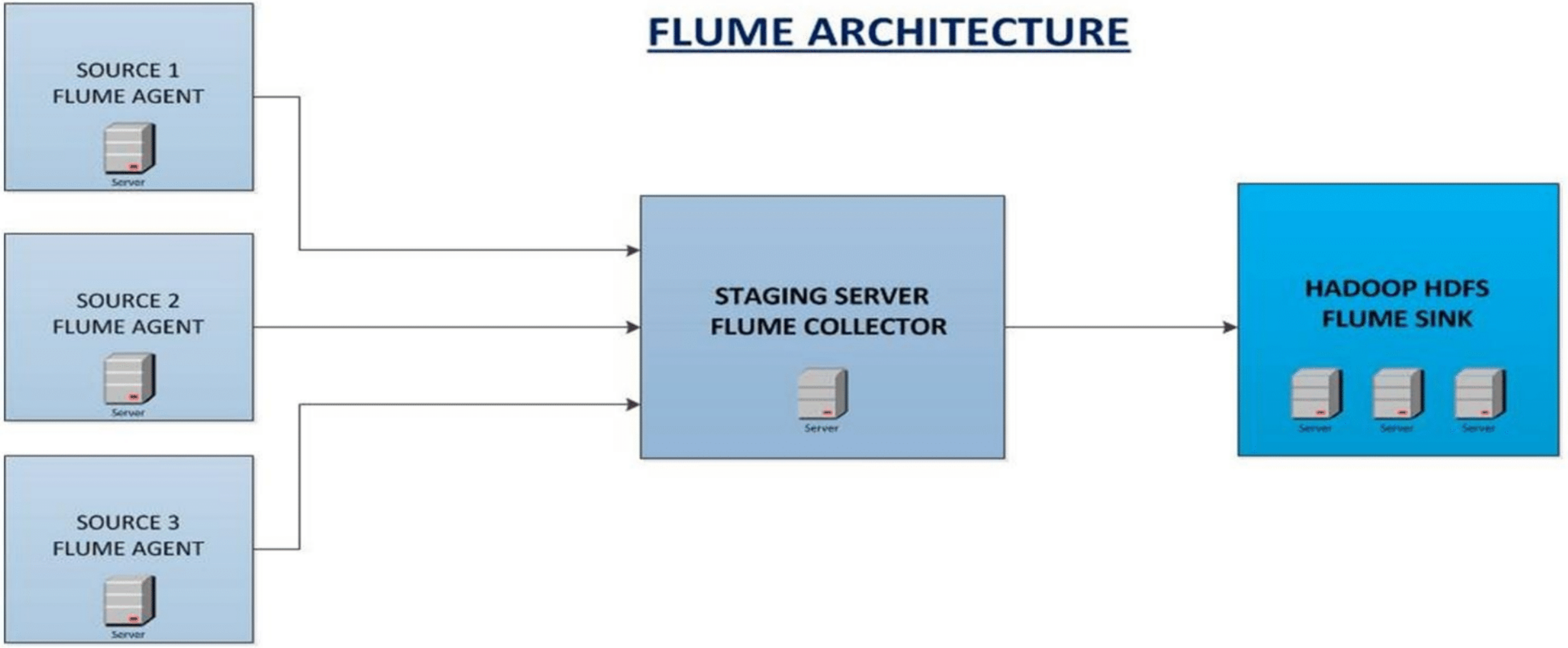
Flume Channels

- Memory Channel
  - Recommended if data loss due to crashes are ok
- File Channel
  - Recommended channel.
- JDBC Channel
  - Persistent store of data but introduces bottleneck and single point of failure.

Memory Channel

- Events stored on heap
- Limited capacity
- No persistence after a system/process crash
- Very fast
- 3 config parameters:
  - capacity: Maximum # of events that can be in the channel
  - transactionCapacity: Maximum # of events in one txn.
  - keepAlive: how long to wait to put/take an event

Current Flume Flow



Monitoring: protocol support

- Several monitoring protocols supported out of the box
  - JMX
  - Ganglia
  - HTTP (JSON)

- Java opts must be set in flume-env.sh to configure monitoring
- Ganglia and HTTP monitoring are mutually exclusive

Thank You

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