Functional Kafka

Marc Juchli   Lorenz Wolf

Supervisor: Prof. Dr. Josef M. Joller

Expert: Dr. Simon Meier

Apache Kafka by LinkedIn
A high-throughput distributed messaging system.
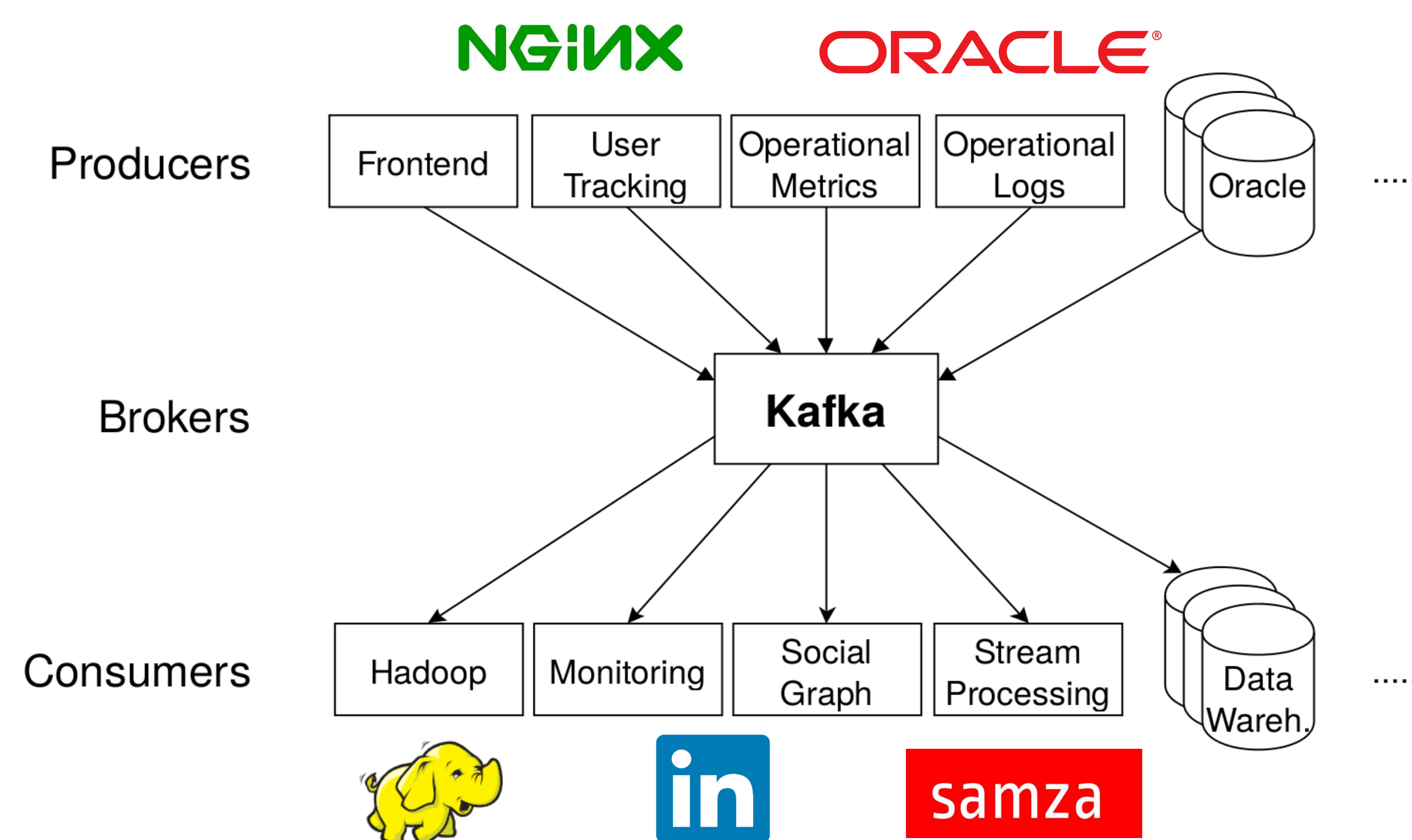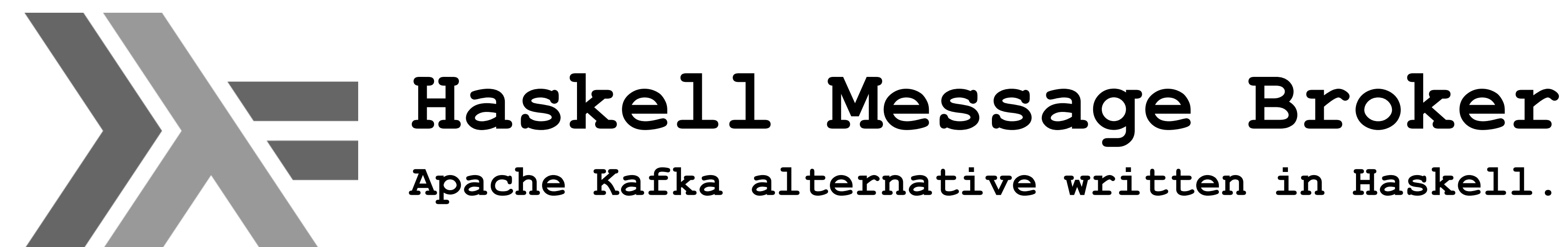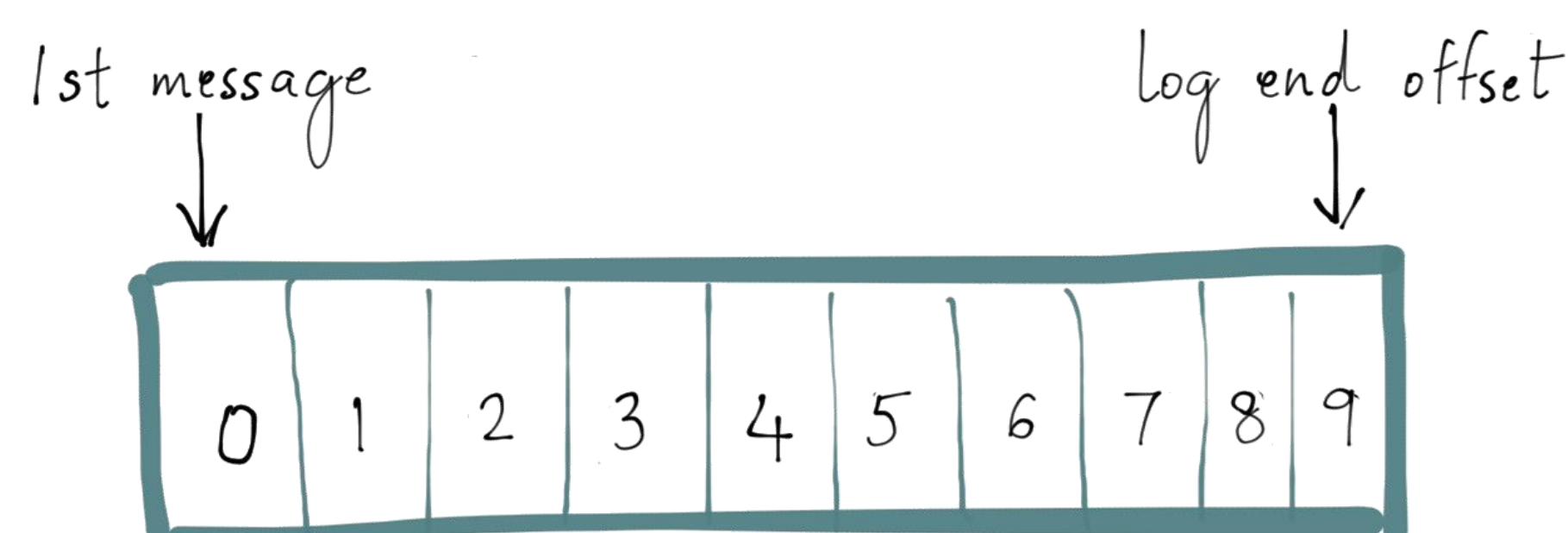
Kafka is a distributed, partitioned, replicated commit log service. It provides the functionality of a messaging system, but with a unique design.

NGINX   ORACLE

Producers	Frontend	User Tracking	Operational Metrics	Operational Logs	Oracle .....
Brokers			Kafka		
Consumers	Hadoop	Monitoring	Social Graph	Stream Processing	Data Wareh. .....

samza

We ♥ Logs
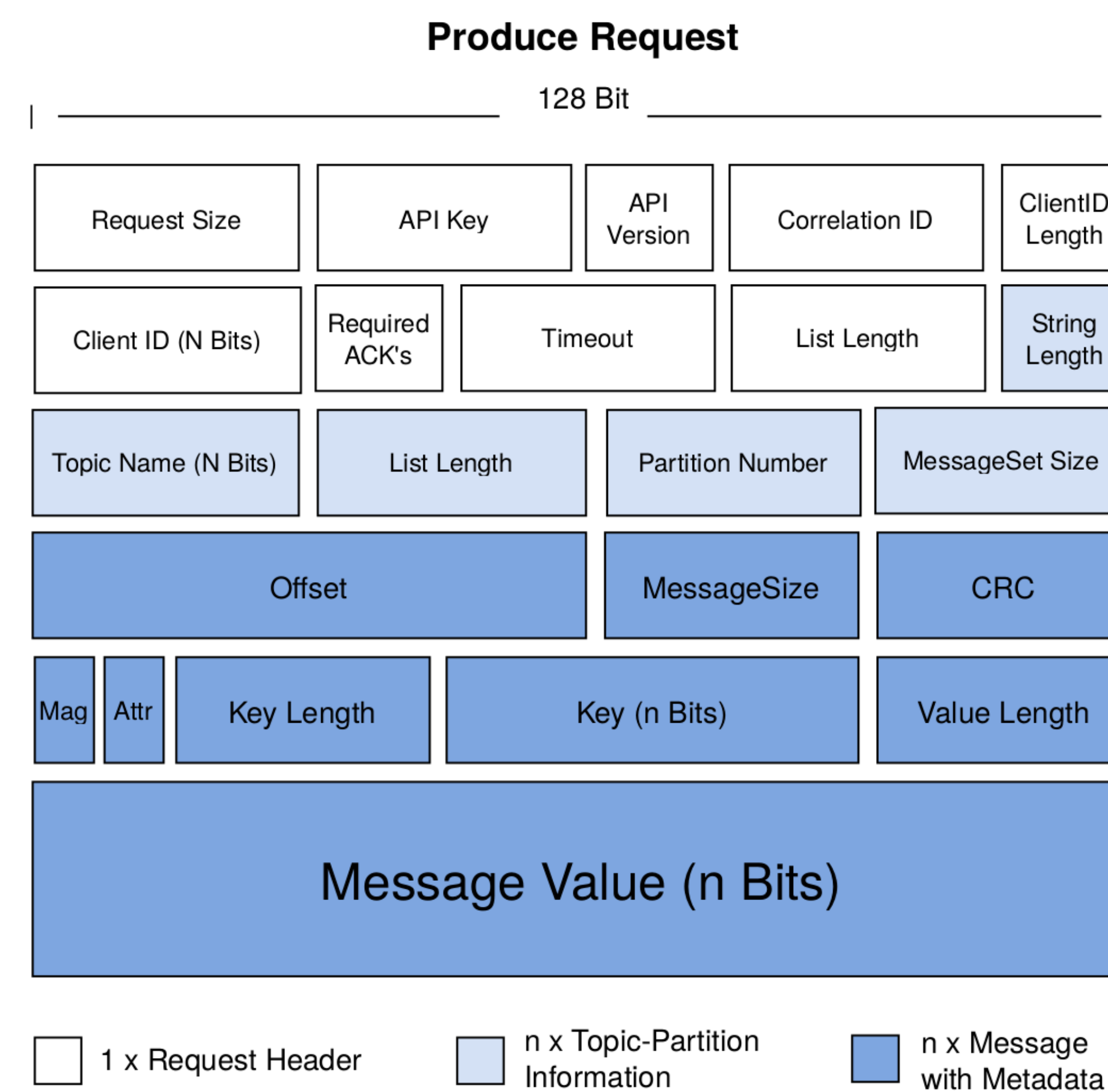
Kafka Messages are persisted on disk. The abstraction of the storage is called Log. An append-only, ordered sequence of records ordered by time:

1st message   log end offset

0 1 2 3 4 5 6 7 8 9

Haskell Message Broker
Apache Kafka alternative written in Haskell.

Approach to adapt concepts of Apache Kafka with the purely-functional programming language Haskell.

Kafka Protocol Implementation
Defining Types
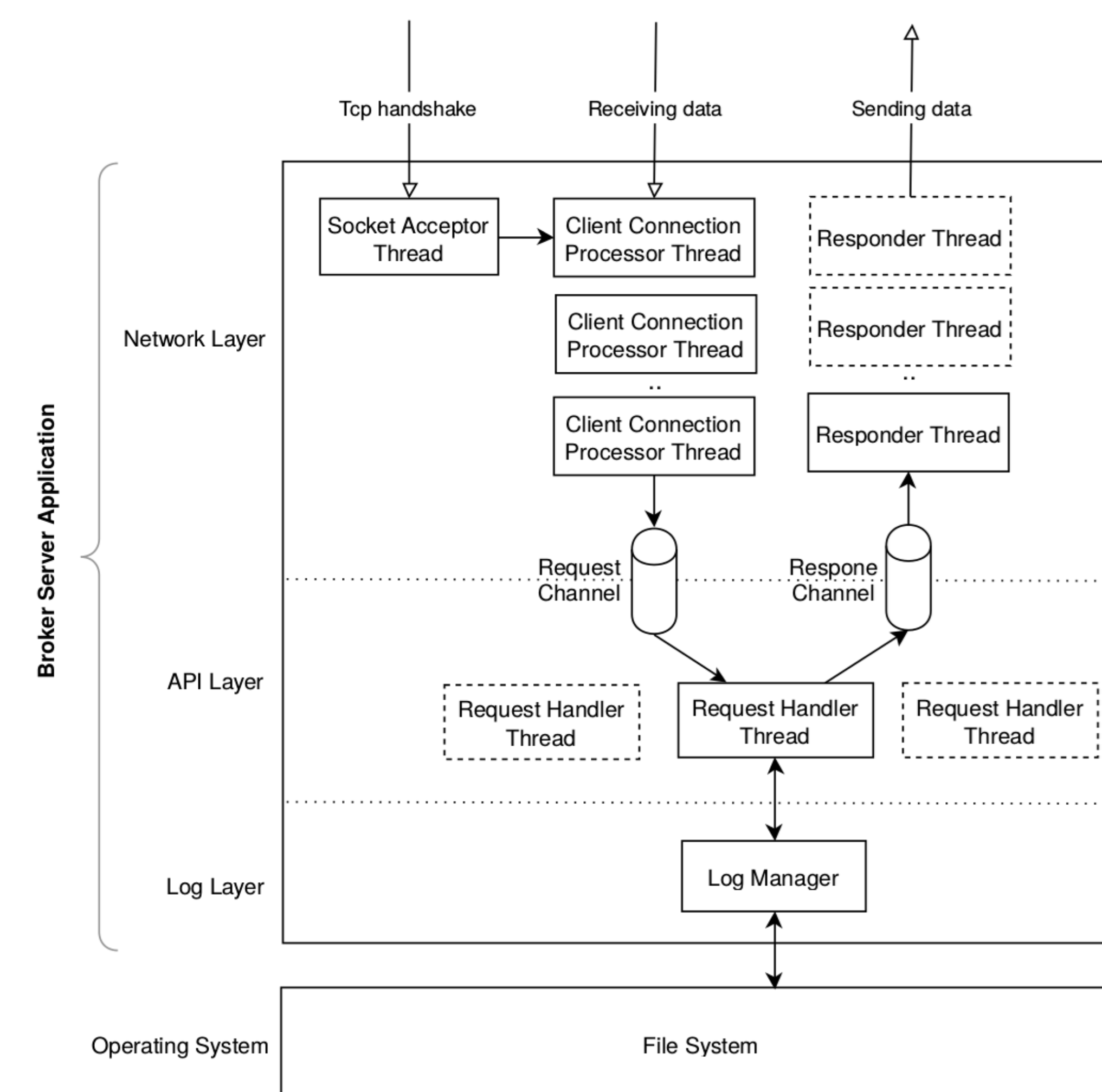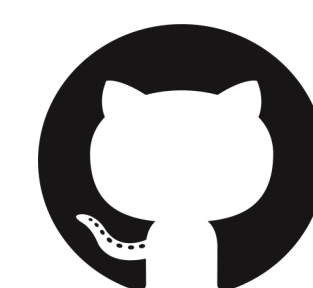Decoding / Encoding
Client API

Broker Implementation
Server Application
Producing / Consuming
Persisting Messages in Log

Produce Request

128 Bit

Request Size	API Key	API Version	Correlation ID	ClientID Length
Client ID (N Bits)	Required ACK's	Timeout	List Length	String Length
Topic Name (N Bits)	List Length	Partition Number	MessageSet Size	

Offset	MessageSize	CRC

Mag	Attr	Key Length	Key (n Bits)	Value Length

Message Value (n Bits)

☐ 1 x Request Header   ☐ n x Topic-Partition Information   ☐ n x Message with Metadata

Extract from Protocol Implementation, Request for producing Messages

Tcp handshake   Receiving data   Sending data

Socket Acceptor Thread   Client Connection Processor Thread   Responder Thread

Network Layer — Client Connection Processor Thread — Responder Thread

Broker Server Application

Client Connection Processor Thread — Responder Thread

Request Channel   Response Channel

API Layer — Request Handler Thread — Request Handler Thread — Request Handler Thread

Log Layer — Log Manager

Operating System — File System

Internals of Broker Server Application

Learn You a Haskell for Great Good!
A Beginner's Guide

Preferred literature to learn Haskell!