Induction training of Dev Team

Message Queue

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Numbers Everyone Should Know

L1 cache reference	0.5 ns
Branch mispredict	5 ns
L2 cache reference	7 ns
Mutex lock/unlock	100 ns
Main memory reference	100 ns
Compress 1K bytes with Zippy	10,000 ns
Send 2K bytes over 1 Gbps network	20,000 ns
Read 1 MB sequentially from memory	250,000 ns
Round trip within same datacenter	500,000 ns
Disk seek	10,000,000 ns
Read 1 MB sequentially from network	10,000,000 ns
Read 1 MB sequentially from disk	30,000,000 ns
Send packet CA->Netherlands->CA	150,000,000 ns

Google

Agenda

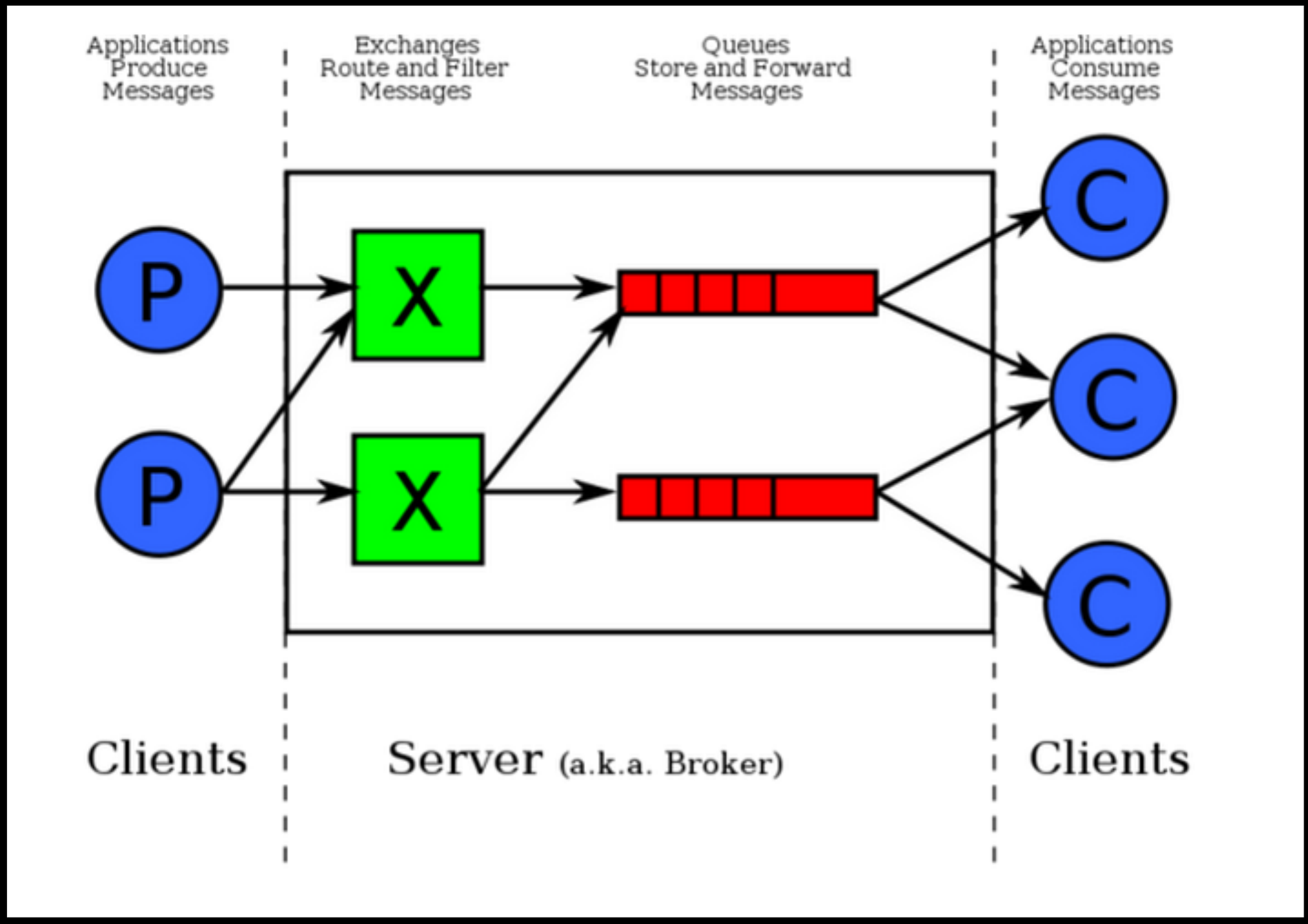
- What's Message Queue
- Key Points
- Message Implementations
- Q&A

What's Message Queue

- Message queues provide an ***asynchronous communications*** protocol, meaning that the ***sender and receiver*** of the message do not need to interact with the message queue at the same time. Messages placed onto the queue ***are stored until the recipient retrieves them***. Message queues have implicit or explicit limits on the ***size of data*** that may be transmitted in a single message and the number of messages that may remain outstanding on the queue.

- Implementation：ZeroMQ, RabbitMQ, ActiveMQ, Kafka, RocketMQ etc

What's Message Queue



Why using Message Queue

- Decoupling
- Asynchronous Communication
- Buffering
- Scalability
- Redundancy
- Resiliency

Key Points

- Delivery: at-most-once / at-least-once /exactly-once
- Durability: Memory / Disk / DB
- Receipt notification: Ack
- Purge: time-to-live
- Filter / Security / Batch / Routing / Query Criteria

Delivery Policy

- at-most-once
  - fire & forget
- at-least-once
  - ack
- exactly-once

Durability

- No persistence: zeromq, akka
- DB: RabbitMQ / RocketMQ
- Disk: Kafka, RoketMQ

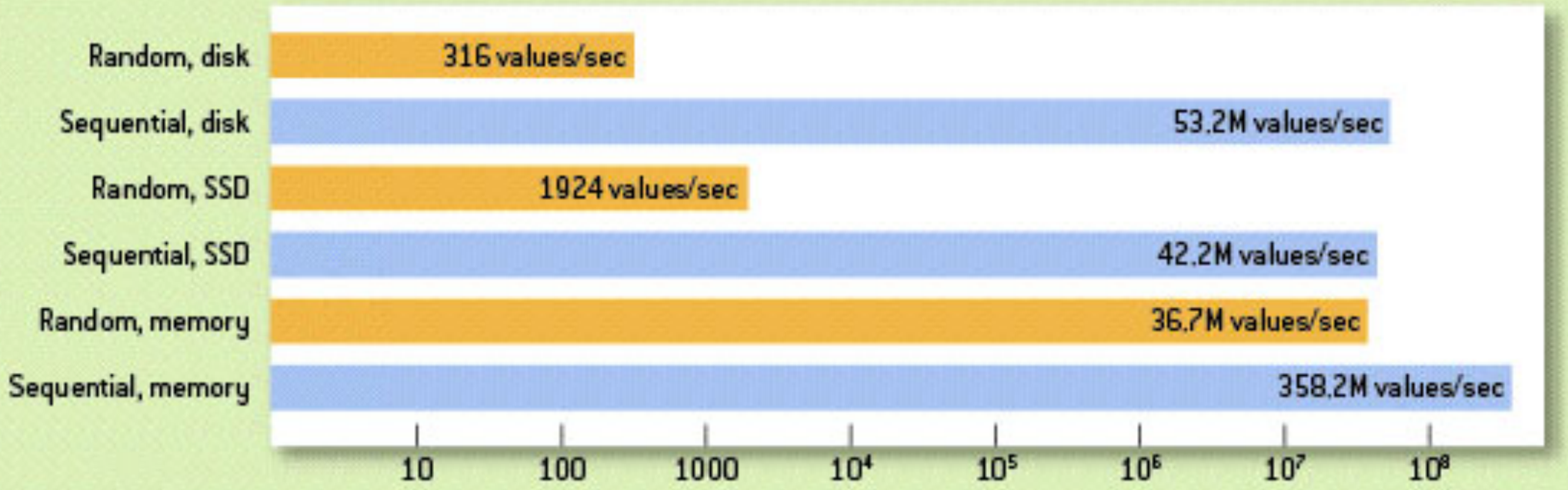
Disk?

- Zero-Copy
- Batch Data in Chunks
- Sequential Disk Access

Disk Performance

FIGURE 3

Comparing Random and Sequential Access in Disk and Memory



Note: Disk tests were carried out on a freshly booted machine (a Windows 2003 server with 64-GB RAM and eight 15,000-RPM SAS disks in RAID5 configuration) to eliminate the effect of operating-system disk caching. SSD test used a latest-generation Intel high-performance SATA SSD.

- http://queue.acm.org/detail.cfm?id=1563874

MQ Implantations

- ZeroMQ: peer to peer, no broker; high throughout
- ActiveMQ: both peer to peer & broker;
- RabbitMQ: broker; Delivery Confirmation; Queue & Pub/Sub; DB Storage; Master/Slave
- Kafka: Broker; High throughout; Consumer group; Persistence on Disk

References

- 消息队列实现精要 by 美团
- Kafka design concerns
- kafka documentation
- Running Kafka At Scale
- Reference Guide for Deploying and Configuring Apache Kafka
- Kafka Ecosystem at LinkedIn
- Kafka papers and presentations
- Advanced Message Queue Protocol
- AMQP architecture
- RabbitMQ Internals
- RocketMQ

Q&A

Indiction Training

- Product / Develop / Operation
- Software lifecycle
- ITIL
- Source Control
- Evolution of A Website's Architecture
- AuAz & SSO
- Cache
- ***Message Queue***
- Storage
- Database and SQL
- NoSQL & New SQL
- TOGAF & 4+1 Arch View
- 测试
- 发布
- 监控