

1.BIO NIO AIO

BIO

IO

NIO

I/O

AIO I/O OS

BIO NIO BIO NIO BIO

Stream NIO channel

NIO I/O I/O

0 block IO zero-copy IO

Java Reactor

Reactor

Reactor

2.NIO

Buffer Channel Channel Channel

flip position limit position 0

clear position 0 capacity limit

rewind position 0

DirectByteBuffer Buffer

I/O

heapBuffer JVM

Channel IO Buffer

FileChannel read write

Selector Channel open Selector register

accept

SelectionKey SelectableChannel Selector wakeup

channel channel

Selector Linux EPollSelectorImpl EPollArrayWrapper

native epoll fdToKey
 epoll map
 fdToKey Channel
 Selector fdToKey
 Channel
 select

Pipe sink source

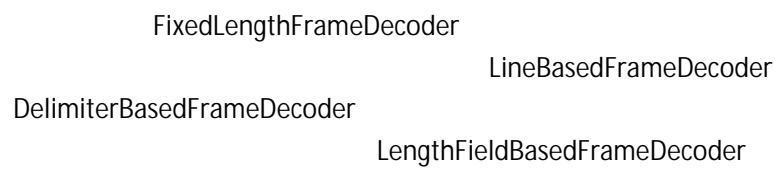
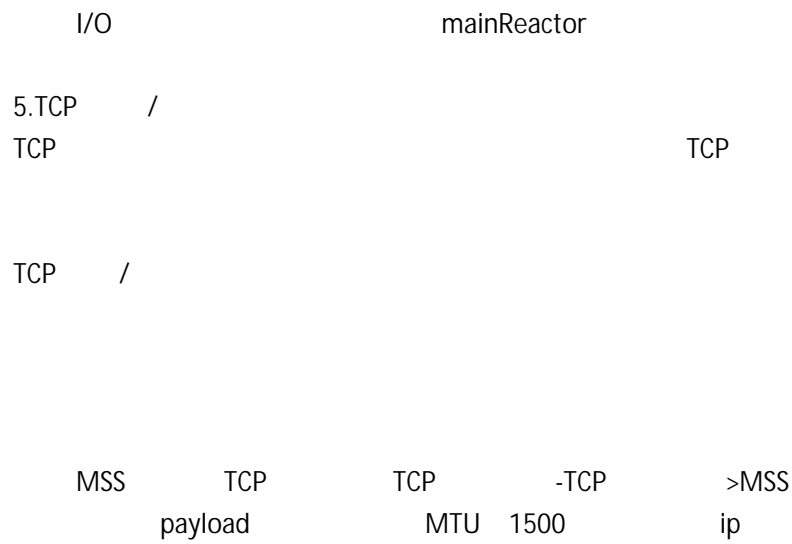
NIO Selector.open() Selector ServerSocketChannel.open()
 Channel bind() register()
 Selector select()

3.Netty
 NIO socket NIO epoll TCP UDP
 decoder/encoder TCP /
 / IO TCP TCP
 ByteBuf
 GC
 Reactor
 CAS
 volatile

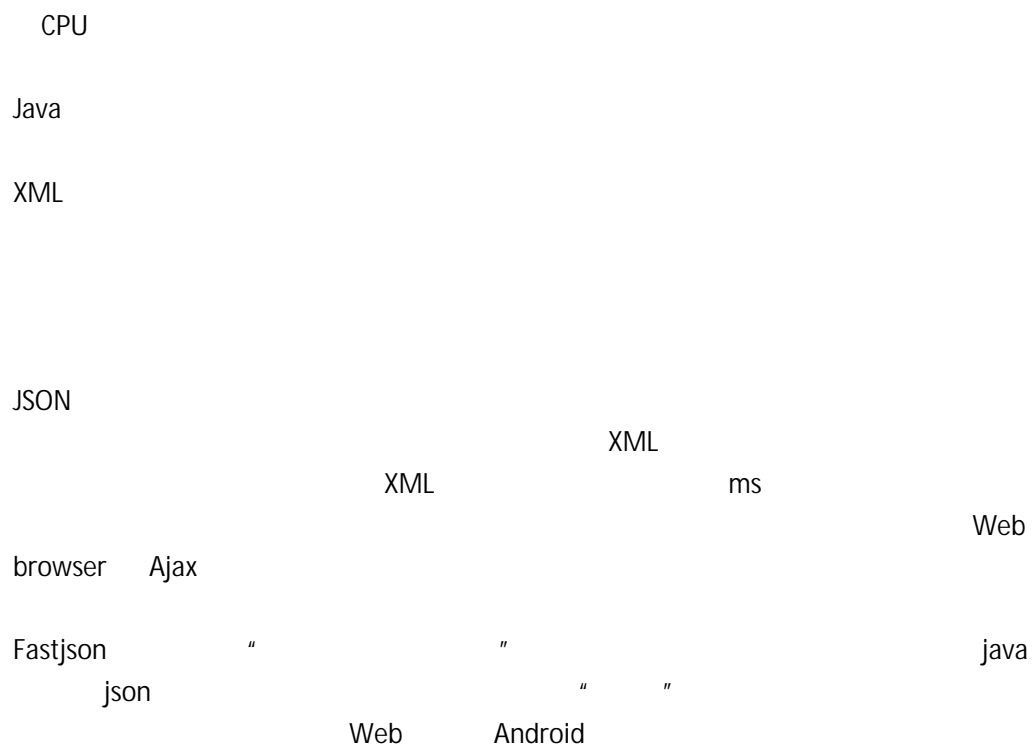
4.Netty
 Netty Reactor
 boss work boss socket accept
 accept work read write NioSocketChannel work
 work Handler

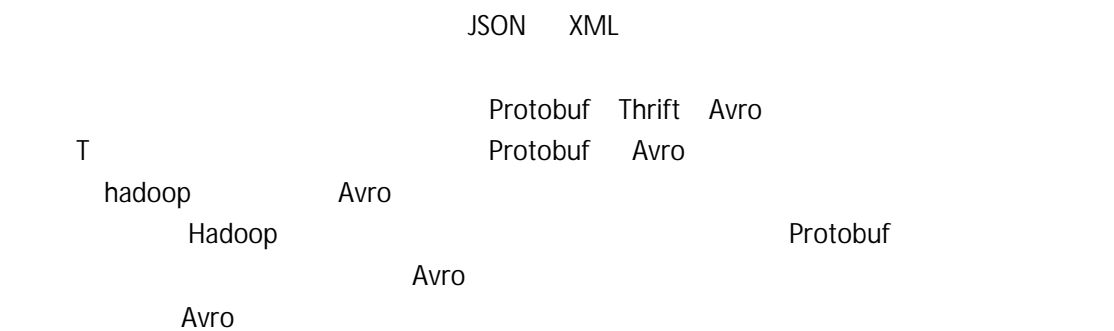
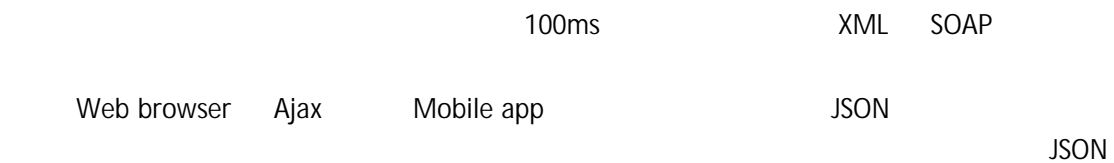
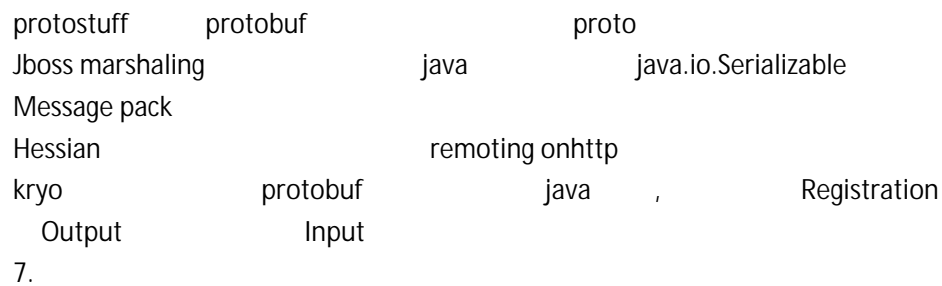
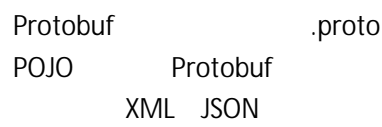
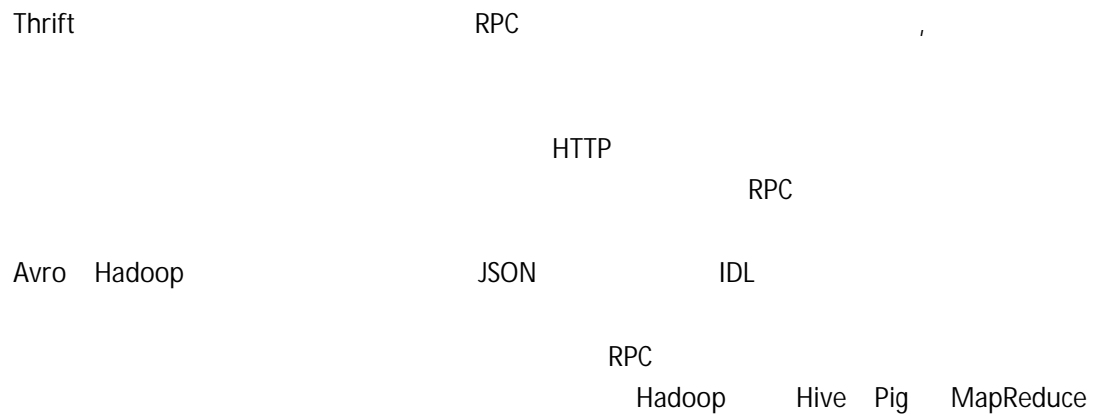
Reactor I/O , /
 / NIO

NIO NIO IO Acceptor TCP
 N 1 1 1 NIO 1 NIO
 Acceptor
 Acceptor Reactor Sub SocketChannel



6.





RPC Thrift

Protobuf
protobuf bool double float int32 int64 string bytes enum
message protobuf required: optional:
repeated: 0

protobuf required 0
optional repeated 0 [1,15]
[16,2047] 2

protobuf
required optional repeated
optional repeated
required

.java Builder
UserProto.User.Builder builder =
UserProto.User.newBuilder();builder.build()

Netty ProtobufVarint32FrameDecoder
ProtobufDecoder(UserProto.User.getDefaultInstance()) UserProto.java
ProtobufVarint32LengthFieldPrepender protobuf
32 ProtobufEncoder

StringBuilder ByteBuf copiedBuffer()

8.Netty
Netty ByteBuffer DIRECT BUFFERS Socket

Buffer JVM
ChannelConfig ByteBuffer ChannelConfig
ByteBufferAllocator Direct Buffer

CompositeByteBuf ByteBuf ByteBuf,
Buffer addComponents header
body ByteBuf, ByteBuf CompositeByteBuf
, CompositeByteBuf

FileRegion FileChannel.transferTo ,
Channel write

wrap , byte[] ByteBuf ByteBuffer Netty
ByteBuf ,

Selector BUG Selector wakeup
CPU 100%

Netty Selector select select
N epoll bug
Selector SocketChannel
Selector Selector

9.Netty
inactive(netty5) :
idleStateHandler

CPU
NIO

-
/
ByteBuf;ByteBuf

Netty SSL V2 V3 TLS SSL CA

volatile CAS AIO Http
IO

TCP SO_RCVBUF SO_SNDBUF 128K 256K
SO_TCPNODELAY NAGLE

10.NIOEventLoopGroup

NioEventLoopGroup(MultithreadEventExecutorGroup)
EventExecutor children [], * 2,

EventExecutor	NioEventLoopGroup	newChild	children
NioEventLoop			
	SingleThreadEventExecutor		NioEventLoop
	hasTasks()	taskQueue	taskQueue
	selectNow()	selector.selectNow()	
taskQueue	select(oldWakeup)		
		Nio	bug
		selectCnt	selector.select
	selector.selectNow()	epoll	bug
	selector.select(timeoutMillis)	selectCnt	selectCnt
512	rebuildSelector	selector	cpu 100% bug
rebuildSelector	openSelector	selector	old selector
selectionKey	cancel	old selector	channel selector
rebuild	selectNow	ready	selectionKey
	processSelectedKeys	I/O	selectedKeys != null
processSelectedKeysOptimized		selectedKeys	IO selectkey
	selectedKeys		processSelectedKey
processSelectedKey	OP_READ	OP_WRITE	OP_CONNECT
	runAllTasks	IO	fetchFromScheduledTaskQueue
	scheduledTaskQueue		taskQueue
	taskQueue	64	
		IO	IO
			IO
	NioEventLoop	Selector	NioServerSocketChannel
NioEventLoop	Selector	NioEventLoop	
Outbound		Channel	unsafe
	tail	head	Outbound
Channel,		Inbound	unsafe
		Arena	Chunk
	2048	page	Chunk
Page		AVL	Page
			Arena
	8k	poolChunkList	PoolSubpage
	page		8k
ByteBuf		4M	put
	zero-copy	flip()	/

AtomicIntegerFieldUpdater

PooledByteBuf

UnpooledHeapByteBuf