

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

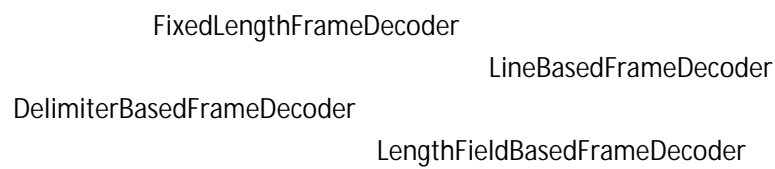
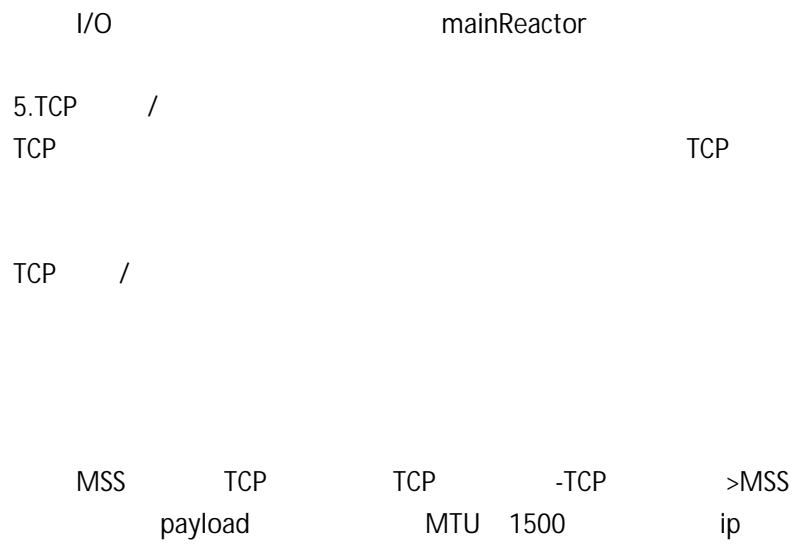
native epoll fdToKey
 epoll map
 fdToKey Channel
 Selector fdToKey
 Channel
 select

Pipe sink source

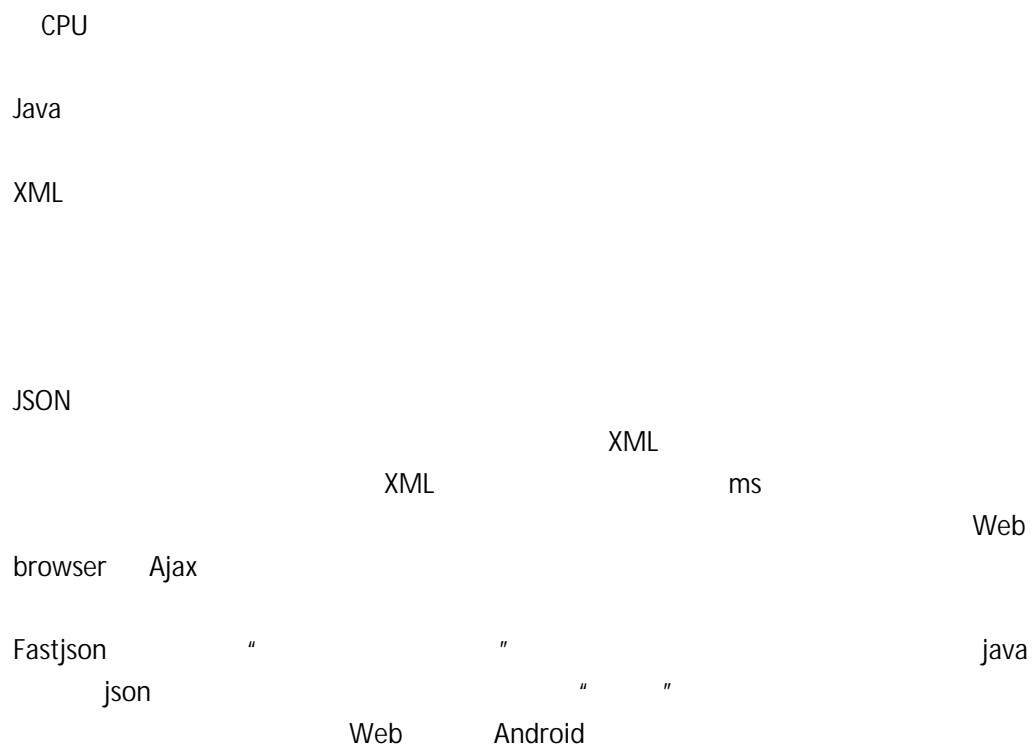
NIO Selector.open() Selector ServerSocketChannel.open()
 Channel bind() register()
 Selector select()

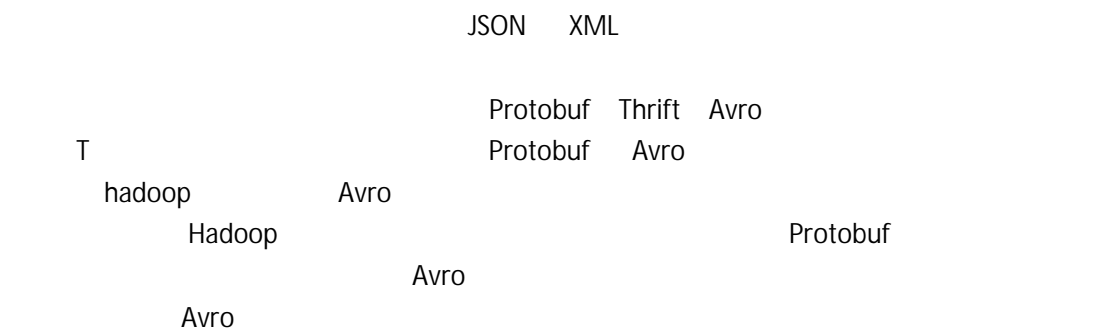
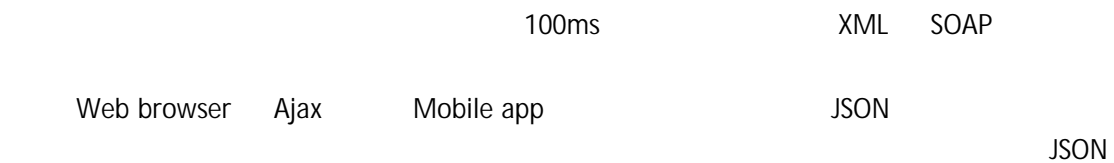
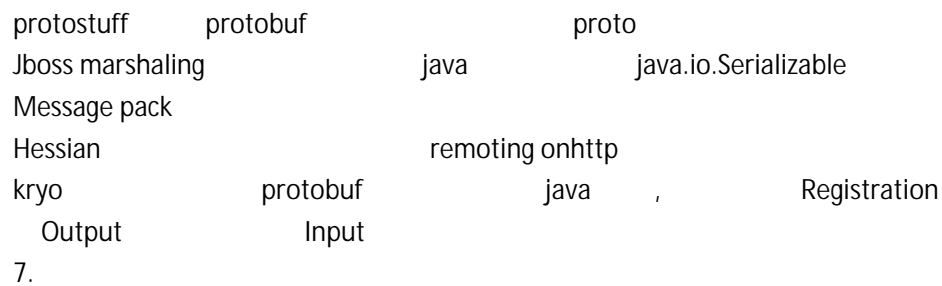
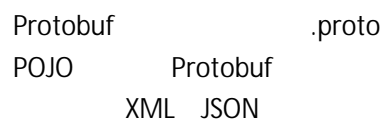
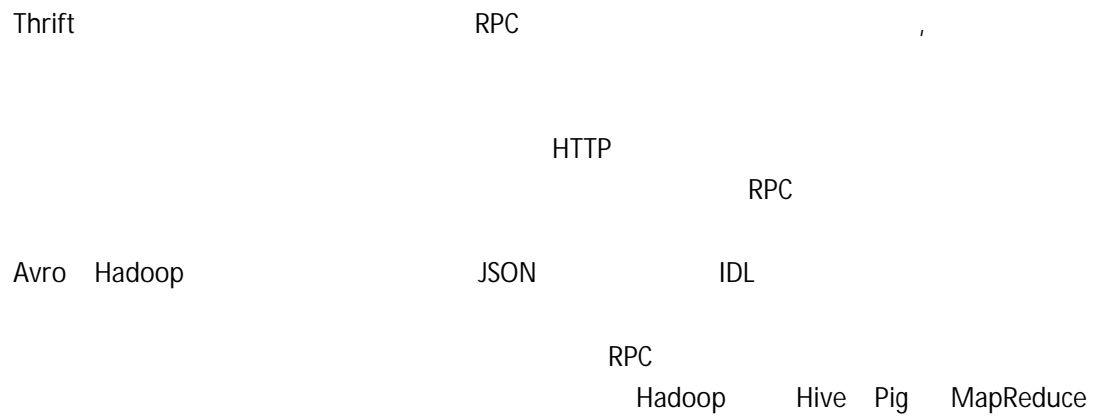
3.Netty
 NIO TCP UDP
 socket epoll cpu
 NIO NIO
 decoder/encoder TCP /
 /
 IO TCP TCP
 ByteBuf
 GC
 Reactor
 CAS
 volatile

4.Netty
 Netty Reactor
 boss work boss
 accept work socket read write
 NioSocketChannel accept
 Handler work
 I/O
 Reactor , /
 / NIO
 NIO NIO
 IO Acceptor TCP
 N 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.tranferTo ,
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
IO AIO Http

TCP SO_RCVBUF SO_SNDBUF 128K 256K
SO_TCPNODELAY NAGLE

10.NIOEventLoopGroup

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

EventExecutor	NioEventLoopGroup	newChild	children	
NioEventLoop				
	SingleThreadEventExecutor		NioEventLoop	run
	hasTasks()	taskQueue	taskQueue	
	selectNow()	selector.selectNow()		
taskQueue	select(oldWakeup)			
		Nio	bug	selectCnt
select (oldWakeup)		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	Outbound
	tail	head	Inbound	unsafe
Channel,				
		Arena	Arena	Chunk
2048	page	Chunk	AVL	Page
Page				Arena
	8k	poolChunkList	PoolSubpage	8k
	page			
ByteBuf		4M	put	
	zero-copy	flip()	/	

AtomicIntegerFieldUpdater

PooledByteBuf

UnpooledHeapByteBuf