Agenda

• Overview
• In-depth View
• Demonstration
• Future
• Conclusion
Agenda: Overview

- Overview
  - What is MINA?
  - Advantages
  - References
- In-depth View
- Demonstration
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What is MINA?

A Multi-purpose Infrastructure for Network Applications
What is MINA?

- Network application framework for Java
- Abstract API
  - Event-driven
  - Asynchronous
- Implementations
  - NIO Socket & Datagram
  - <Your favorite transport>
Advantages: Productivity

• Unit test friendly
  • Abstract API + mock objects

• Extensible
  • Runtime modification of application behavior using ‘filters’

• Maintainable and Reusable
  • Separation of networking code (MINA), protocol codec, and business logic
Advantages: Performance

• AMQP Test
  • Client and server
    • 4 dual-core Opterons
    • Via Gigabits Ethernet
    • 10 clients
  • Payload: 256+ bytes (excl. AMQP headers)
  • Avg: 180,000 msg/sec
  • Max: 220,000 msg/sec

Courtesy of Robert J. Greig, JP Morgan Chase & Co.
Advantages: Stability

• API design
  • Running toward 1.0 fast

• Implementation
  • We’ve been doing this since 2004
**Who Uses MINA?**

- **The Apache Directory Project**
  - LDAPv3
  - ChangePW
  - Kerberos
  - DHCP
  - DNS
  - NTP

- **XFire + AsyncWeb**
  - SOAP over HTTP

- **AMQP**
  - Advanced Message Queuing Protocol

- **QuickFIX/J**
  - Financial Information eXchange

- **RED5 Server**
  - Macromedia Flash Media RTMP
Who Uses MINA?

- **ObjectRADIUS**
- **FreeCast**
- **JStyx**
- **Proprietary projects**
  - XMPP (Jabber · GTalk) implementation
  - SMS · MMS Gateways
  - And many more!
Agenda: In-depth View

- Overview
- In-depth View
  - At a Glance
  - Core Constructs
  - In-VM Pipe
- Demonstration
- Future
- Conclusion
At a Glance

- Remote Peer
  - Low-level I/O
  - Low-level I/O

- IoService
  - I/O Event
  - Filtered I/O Request

- IoFilterChain
  - IoFilter #1
  - IoFilter #2
  - IoFilter #3

- IoSession
  - IoHandler

Legend
- Core
- Extension Point
- Protocol Implementation

- Performs Actual I/O
- Filters Events & Requests
- A Connection

<Your Protocol Logic>
In-depth

**IoService**

**Server-side:** Accepts clients

- IoAcceptor
  - nio::SocketAcceptor
  - nio::DatagramAcceptor
  - vmpipe::VmPipeAcceptor

**Client-side:** Connects to a server

- IoConnector
  - nio::SocketConnector
  - nio::DatagramConnector
  - vmpipe::VmPipeConnector

And their implementations
IoFilter

• An event & request interceptor
  • Reusable
  • Hot-deployable

• SSL · TLS
• Thread pool
• Performance profiler
• Lightweight firewall

• Logger
• Overload detector
• Traffic shaper
• Authorization
ThreadPoolFilter

No thread pool: single thread setting for minimal latency

One thread pool: general setting for high throughput

More than one thread pool: special setting for CPU-intensive jobs
ProtocolCodecFilter

• Clear separation and reusability

• Business logic - IoHandler

• Protocol codec - ProtocolCodecFilter
  • Object serialization
  • Text line
In-depth

ProtocolCodecFilter

Remote Peer

Legend
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IoService

I/O Event

Filtered I/O Event

I/O Request

Filtered I/O Request

ProtocolCodecFilter

Encoder

Decoder

Protocol Codec Factory

→ POJO

ByteBuffer

→ Business Logic Only!

POJO →

ByteBuffer

→ POJO
In-VM Pipe

I/O events are converted into ‘Direct Method Invocations’

⇒ No protocol codec
⇒ No network latency
⇒ Using the same API
Agenda: Demonstration

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Reverse Echo Server

- Echo server which reverses a line
- Using a built-in text line protocol codec in MINA
Agenda: Future

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• Future
  • MINA as a Platform
  • Real-time Management
  • Participation
• Conclusion
MINA as a Platform

Real-Time Management System

HTTP  FTP
SMTP  ……

Rapidly Prototyped Protocol
Visual Protocol Designer (ASN.1-based)

Kerberos
LDAP

Popular Protocols
Others
ASN.1 Codec

MINA Core Library

Future
Real-Time Management System

• A universal management view
• JMX console and Web browser
• Real time access
  • Server traffic
  • IoFilter Hot-deployment
  • Which client is sending what message now?
  • Which message takes too long to process?
  • And <what you want to monitor>
We Need Your Participation!

• Sounds exciting?
• Your feedback is our blood!
  • Ask questions
  • Criticize design flaws
  • Report bugs
  • Publish performance test results
Agenda: Conclusion

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Conclusion

• MINA is...
  • A network application framework for...
    • Productivity
    • Performance
    • Stability

• MINA will be...
  • Full-featured dev. & mgmt. platform for network applications
Resources

• Homepage
  • http://directory.apache.org/subprojects/mina/
  • More useful examples

• Mailing List
  • mina-dev@directory.apache.org
Thank You!

Q & A