Introduction to MINA

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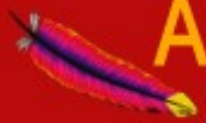
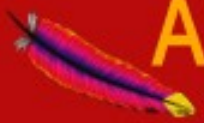


Agenda

- Overview
- In-depth View
- Demonstration
- Future
- Conclusion



Agenda: Overview

- Overview
  - What is MINA?
  - Advantages
  - References
- In-depth View
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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 — RADIUS
- FreeCast — P2P media streaming
- JStyx — A NFS-like file sharing protocol
- 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
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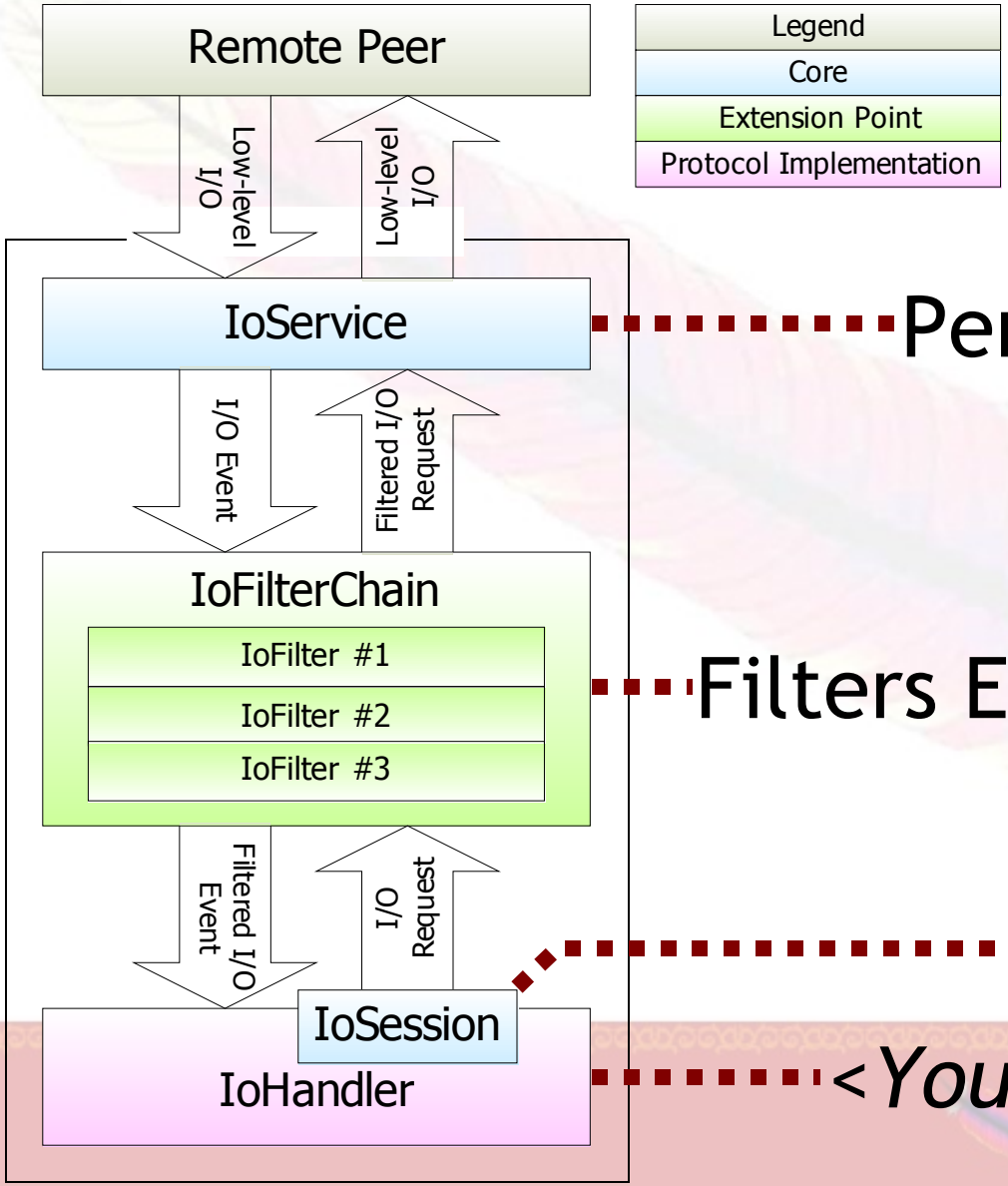
At a Glance



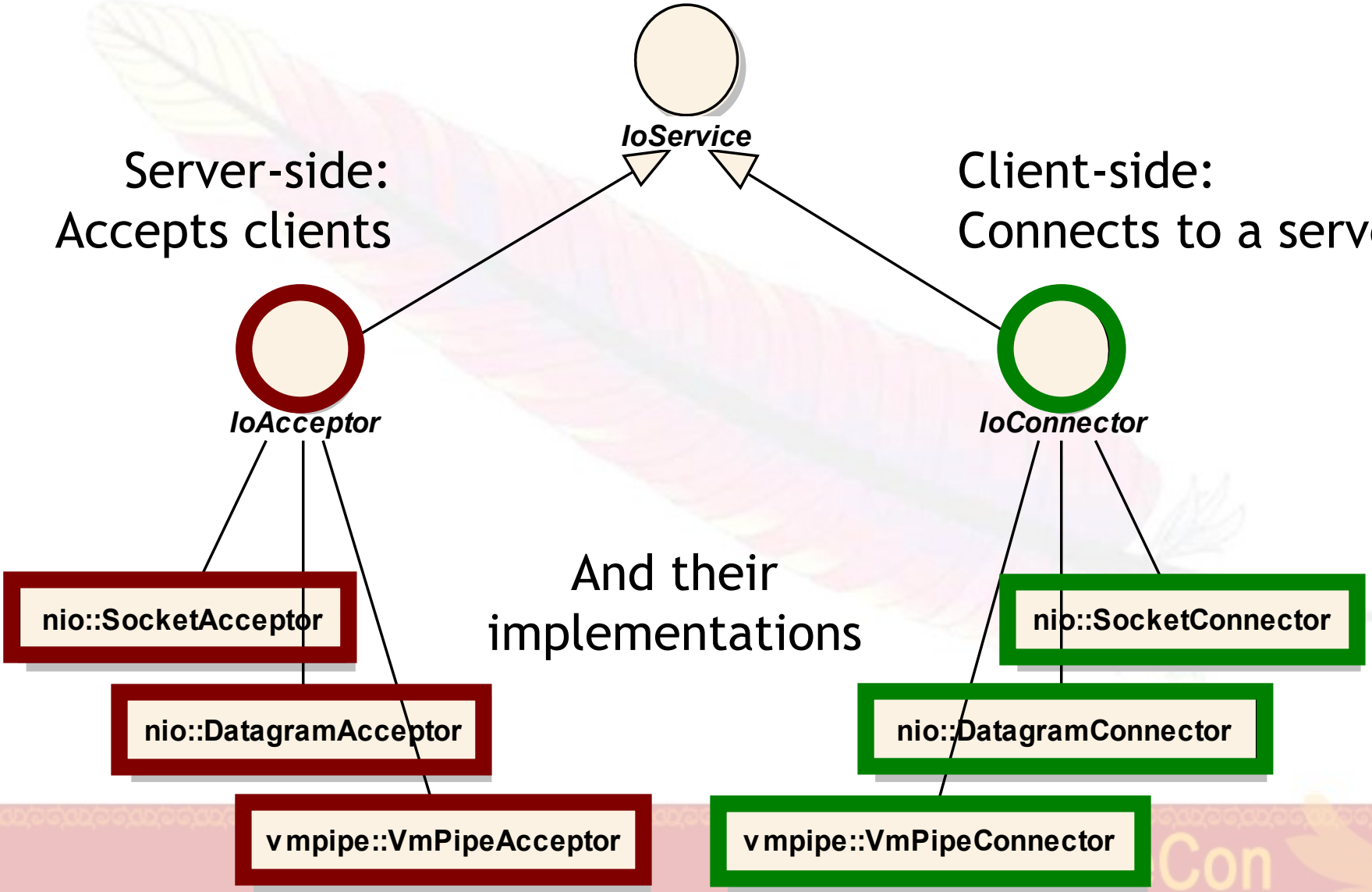
Performs Actual I/O

Filters Events & Requests

A Connection

<Your Protocol Logic>

IoService


IoService
Server-side:
Accepts clients
Client-side:
Connects to a server
IoAcceptor
IoConnector
nio::SocketAcceptor
nio::DatagramAcceptor
vmpipe::VmPipeAcceptor
And their
implementations
nio::SocketConnector
nio::DatagramConnector
vmpipe::VmPipeConnector

IoFilter

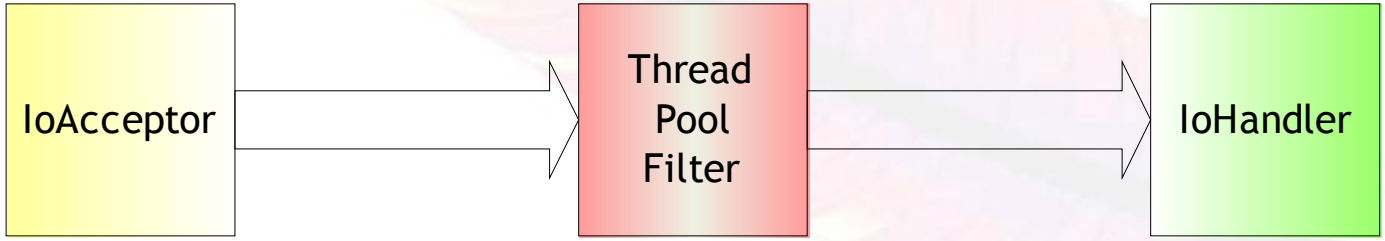
- An event & request interceptor
  - Reusable
  - Hot-deployable

- SSL · TLS
- Thread pool
- Performance profiler
- Lightweight firewall
- Logger
- Overload detector
- Traffic shaper
- Authorization

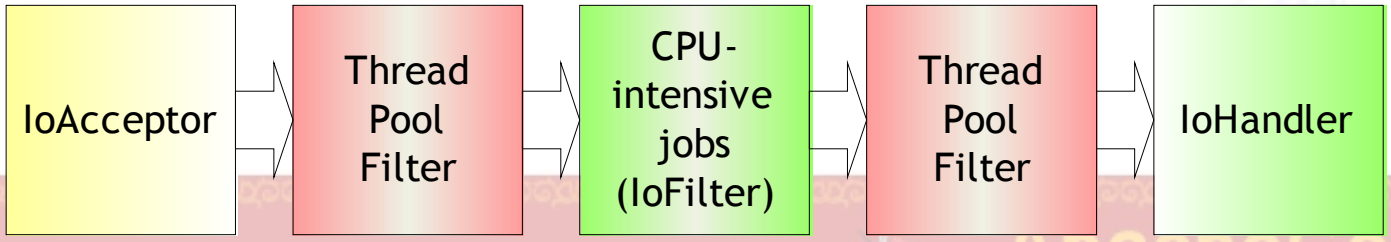
ThreadPoolFilter

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

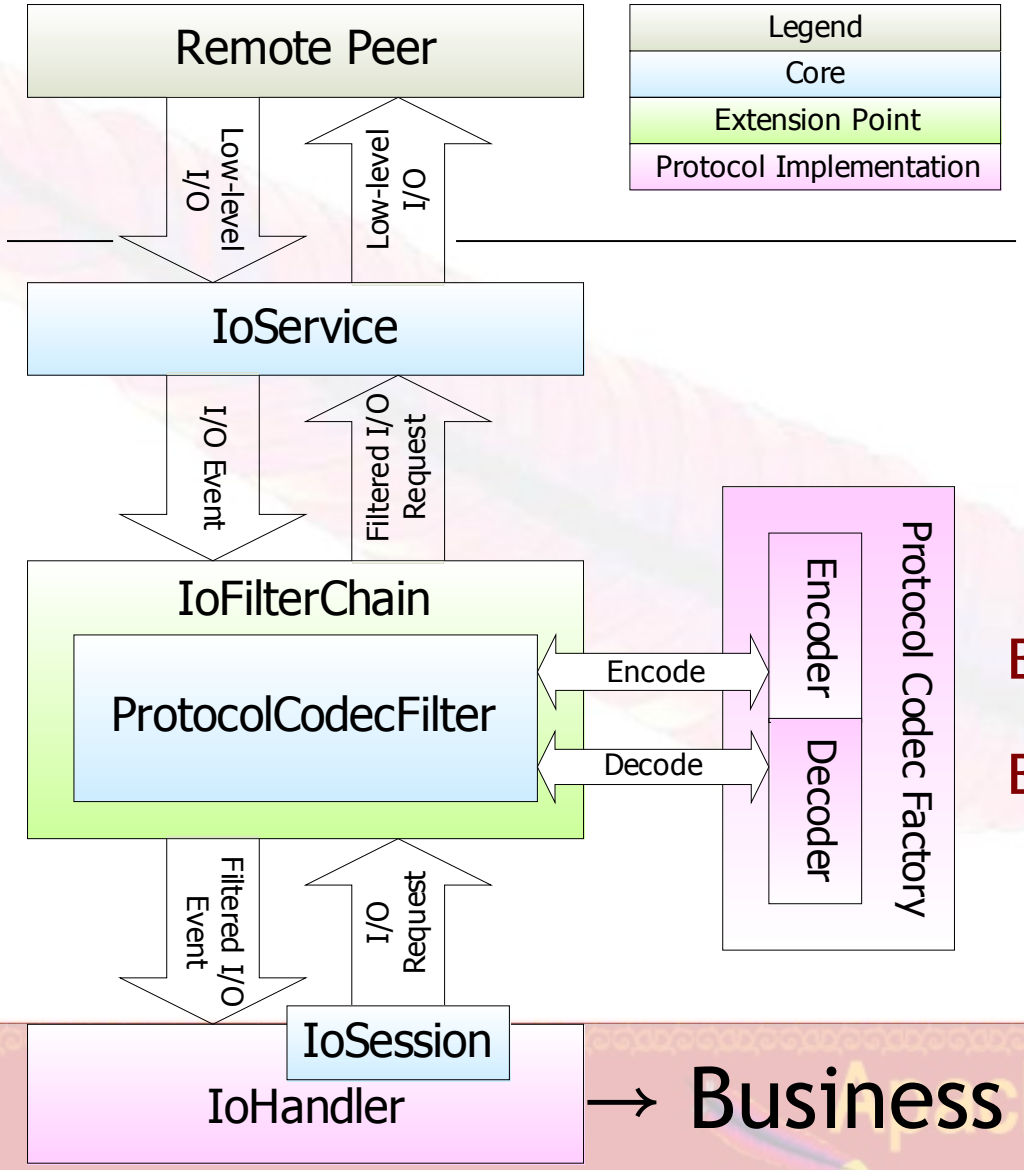


ProtocolCodecFilter

- Clear separation and reusability

- Business logic – `IoHandler`
- Protocol codec – `ProtocolCodecFilter`
  - Object serialization
  - Text line

ProtocolCodecFilter



POJO → ByteBuffer

ByteBuffer → POJO

→ Business Logic Only!

In-VM Pipe

I/O events are converted into

'Direct Method Invocations'

⇒ No protocol codec
⇒ No network latency
⇒ Using the same API

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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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  - MINA as a Platform
  - Real-time Management
  - Participation
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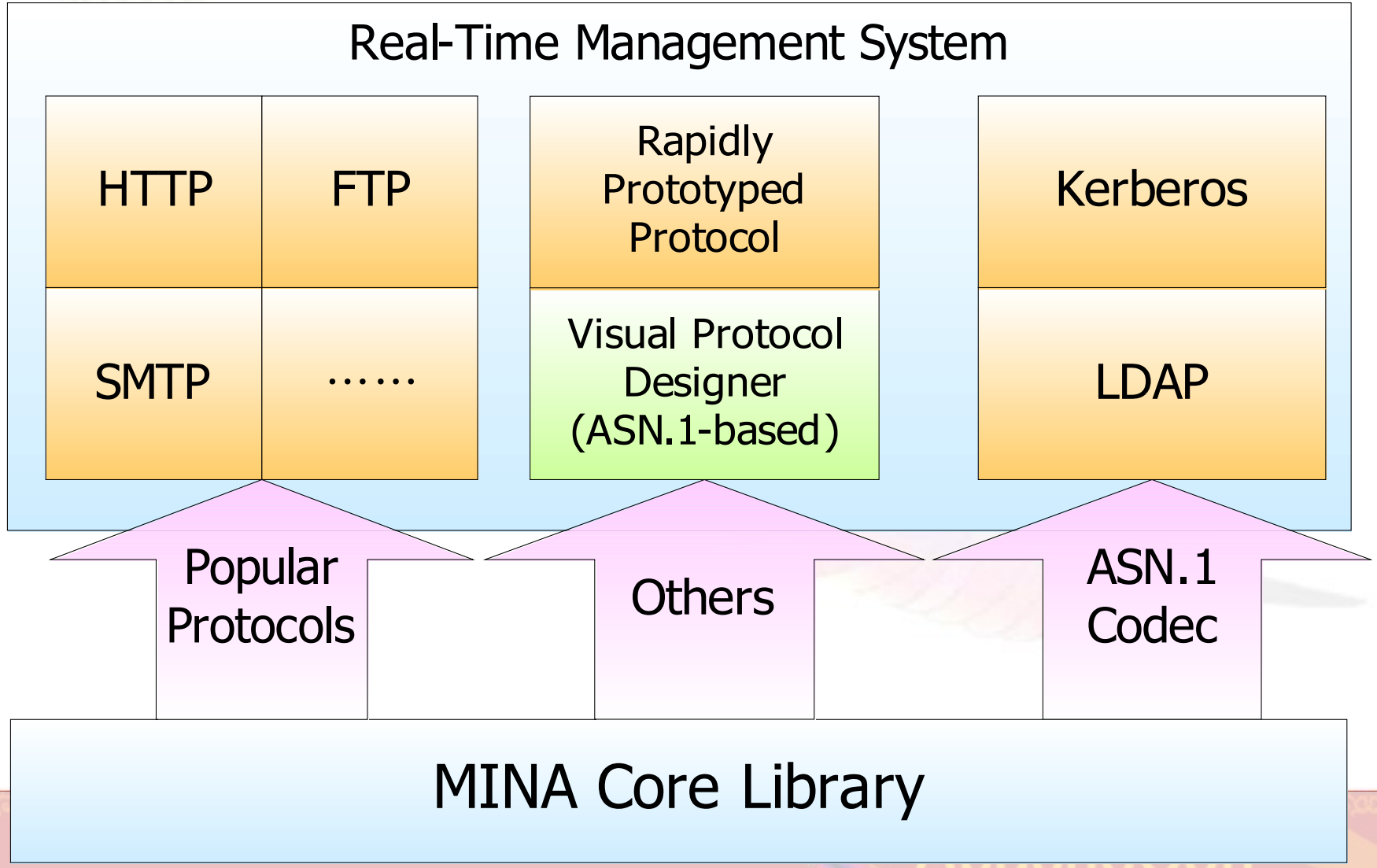
MINA as a Platform



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

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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