WorkShop 2015:
Using OpenSSL to boost TLS performance with Apache Tomcat

Agenda

- **Introduction.**

- **Overview of Problem.**

- **Tomcat-native and Netty.**

- **Work to do.**

- **Q & A.**

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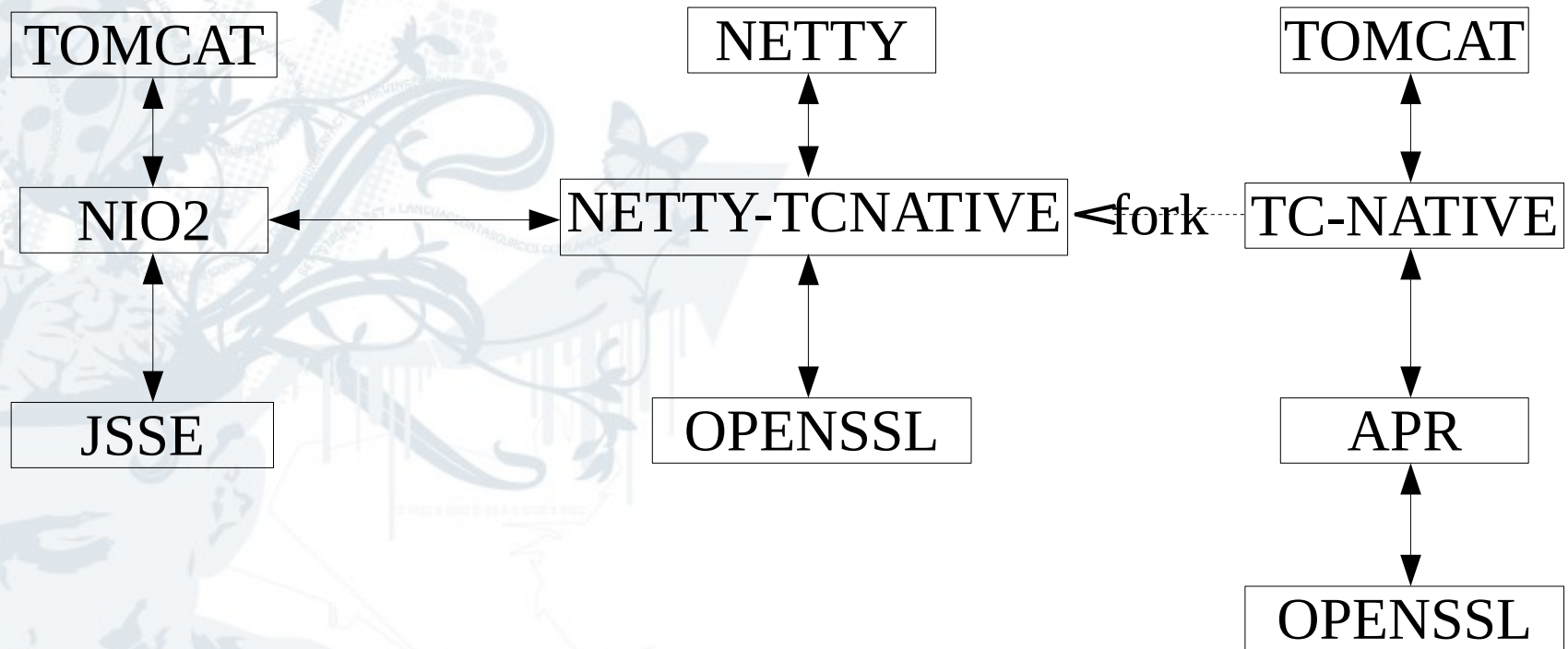.org

Who I am

- **Red Hat employee**

  www.redhat.com

- **Tomcat committer**

  tomcat.apache.org

- **In Neuchatel Office**

Tomcat and Netty

```
TOMCAT          NETTY              TOMCAT
  ↕               ↕                   ↕
NIO2 ←——→ NETTY-TCNATIVE <·fork·· TC-NATIVE
  ↕               ↕                   ↕
JSSE          OPENSSL               APR
                                     ↕
                                  OPENSSL
```
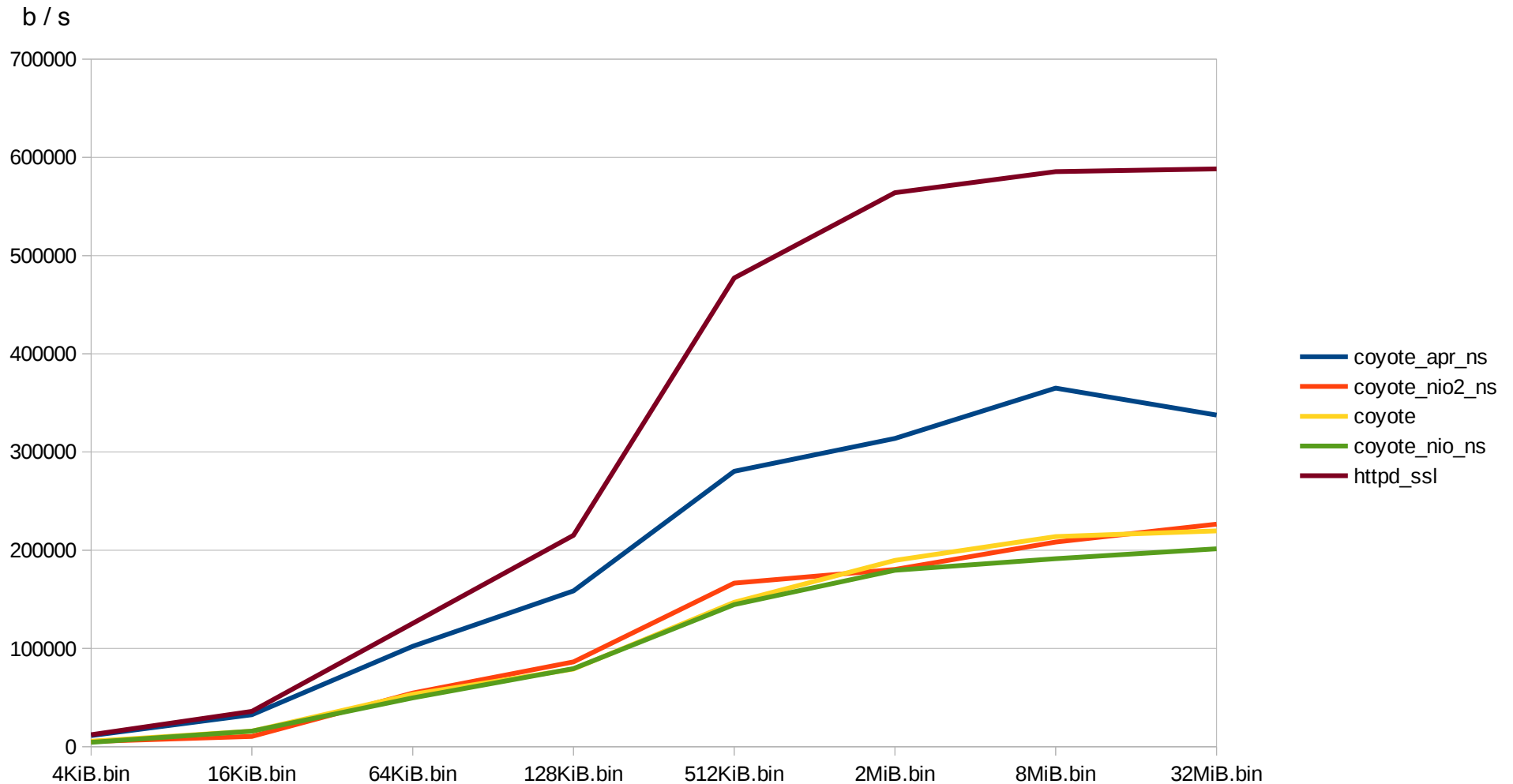
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Problems:

- **Netty:**
  - **A lot of dependencies**
  - **A fork of an ASF project**
  - **Works only in Netty**
- **Tomcat + Native**
  - **Needs a special connector**
  - **A lot of C code**
  - **Works mostly in Tomcat**
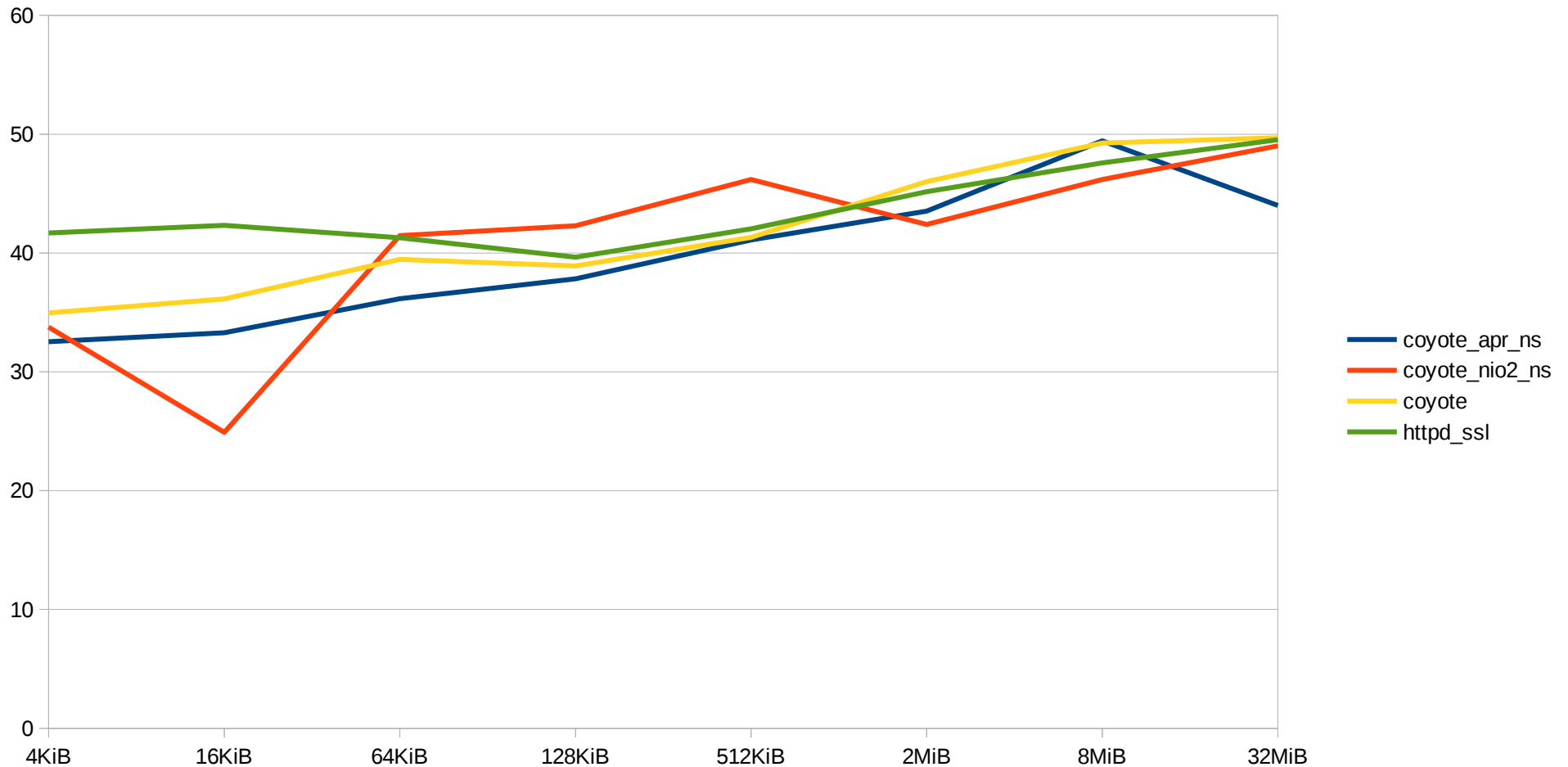- **Tomcat + JSSE:**
  - **Lower performance**
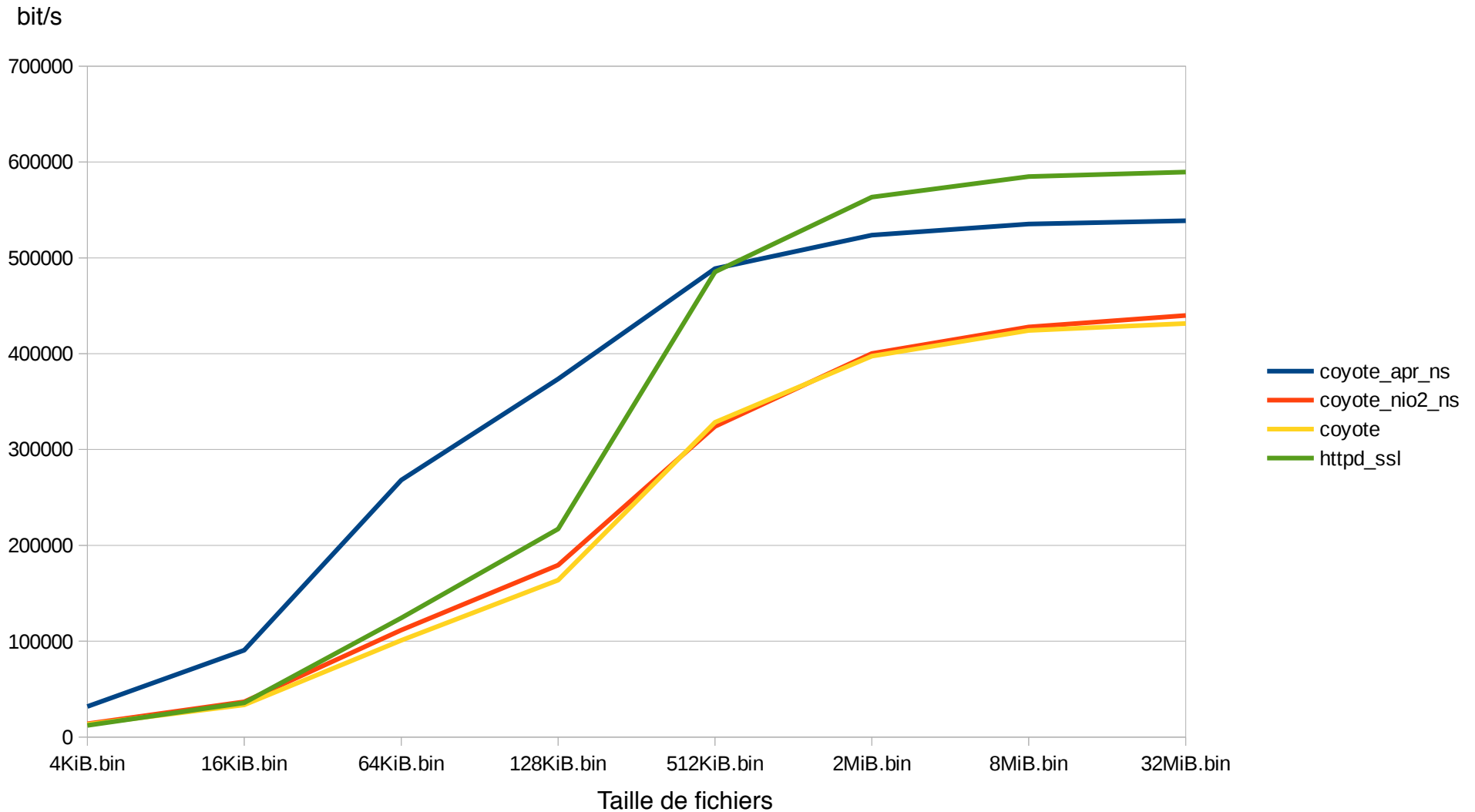
SSL Connector Throughput (c4)

SSL Connector CPU Use (c4)

CPU %

Legend:
- coyote_apr_ns
- coyote_nio2_ns
- coyote
- httpd_ssl

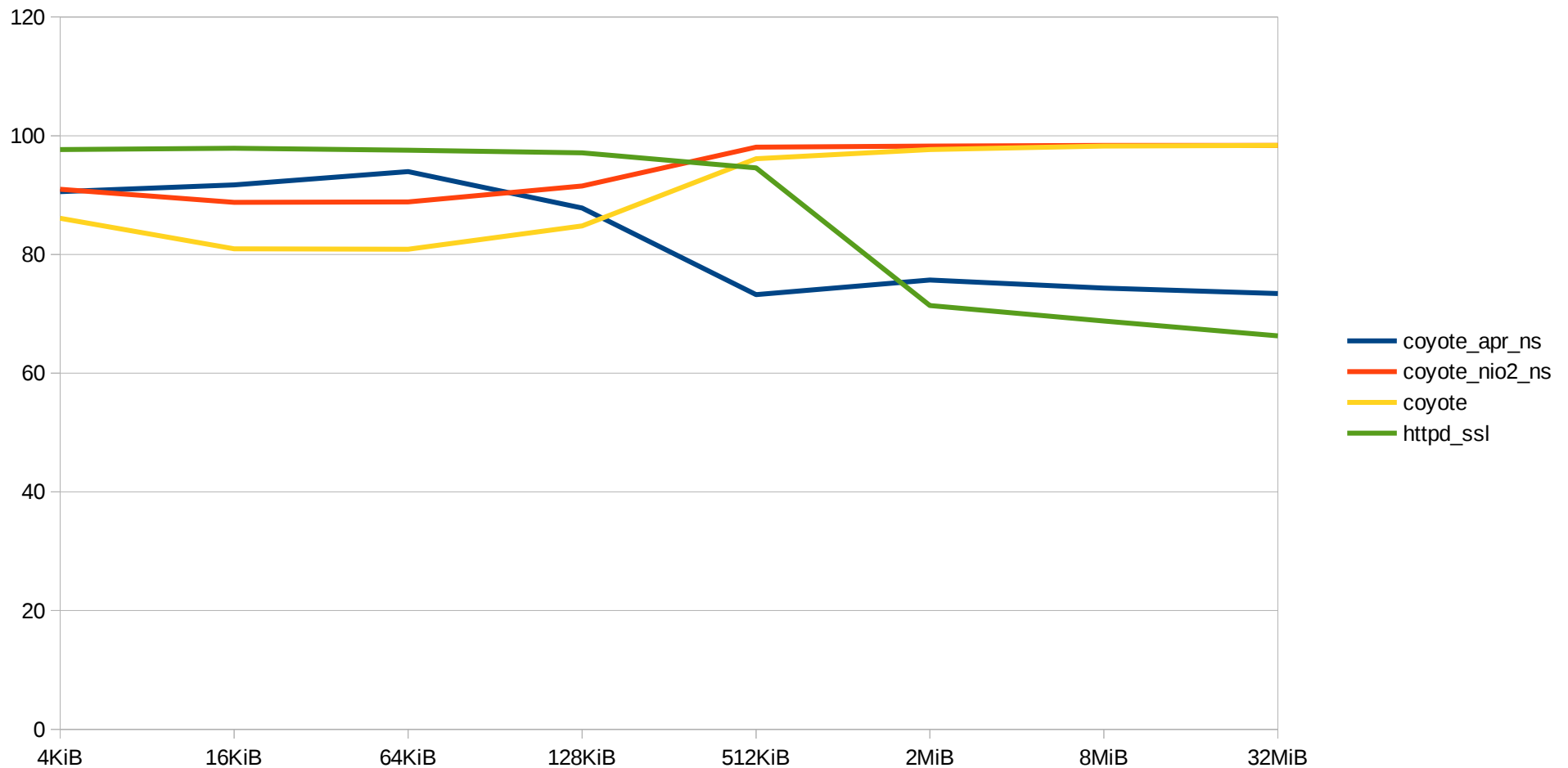X-axis: 4KiB, 16KiB, 64KiB, 128KiB, 512KiB, 2MiB, 8MiB, 32MiB

SSL Connector Throughput (c40)

SSL Connector CPU Use (c40)

Work to do

- **Study the actual code:**
  - **Netty-TCnative**
  - **Tomcat native**
- **Code to write:**
  - **a layer to use the native part of Netty-TCnative directly with Tomcat NIO2 connector or a small test server.**
- **Validation:**
  - **Run performance tests.**
    - **AB (Apache Bench) or improve one.**
  - **Analyze and comments.**

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Goals

- ## Have something like:

    – **org.apache.tomcat.util.net.jsse.JSSEImplementation**

    – **As openssl.OpenSSLImplementation for example**

- ## Called from:

    – **org.apache.tomcat.util.net.SSLImplementation**

- ## Mostly java:

    – **The C code is already available**

    – **extent the SSLContext to use the OpenSslEngine from netty**

    – **And load it from the new openssl.OpenSSLImplementation**

    – **Targeted platform: Linux**

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Useful information

- **Tomcat:**
  - **https://github.com/apache/tomcat**
  - **https://github.com/apache/tomcat-native**

- **Netty:**
  - **https://github.com/netty/netty-tcnative/
    https://github.com/netty/netty**

- **OpenSSL:**
  - **http://openssl.org/**

- **Apache Httpd (for AB):**
  - **http://httpd.apache.org/**
  - **Usually included in Linux distros**

For more info:

- Main sites:
  - Oracle
  - https://github.com/netty
  - http://tomcat.apache.org
  - Links to docs, downloads, forums, dev lists, etc
  - Mail: jclere@redhat.com
- Questions?

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