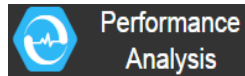


AJDK



Java at Alibaba

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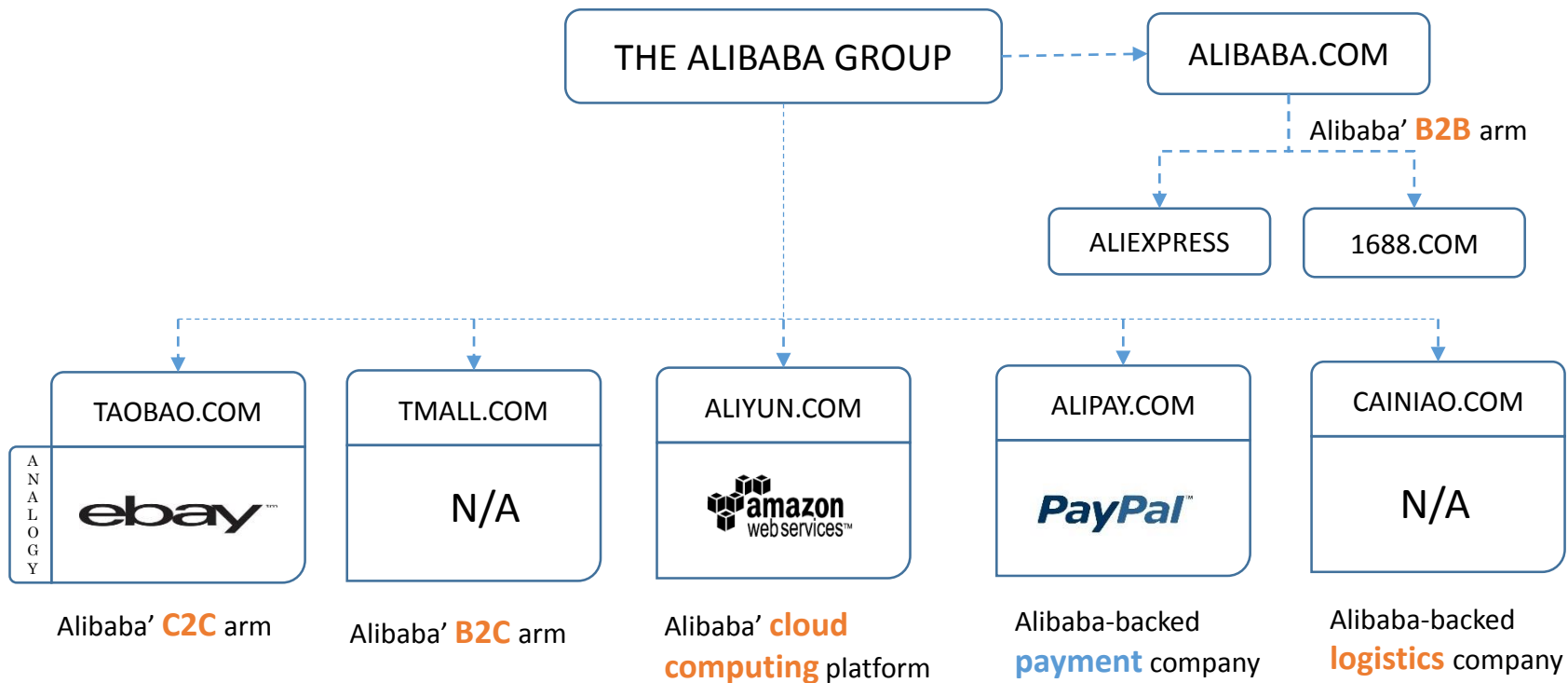


基础架构事业群
Alibaba Infrastructure Service

Agenda

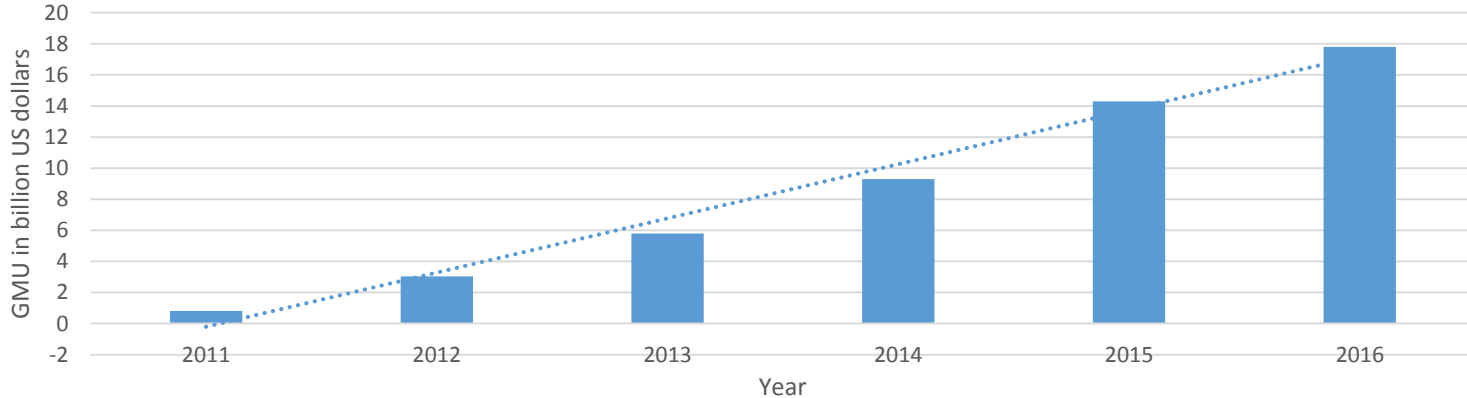
- About Alibaba
- How Java is used at Alibaba
- Alibaba and community

Alibaba Family Tree



China's Singles' Day

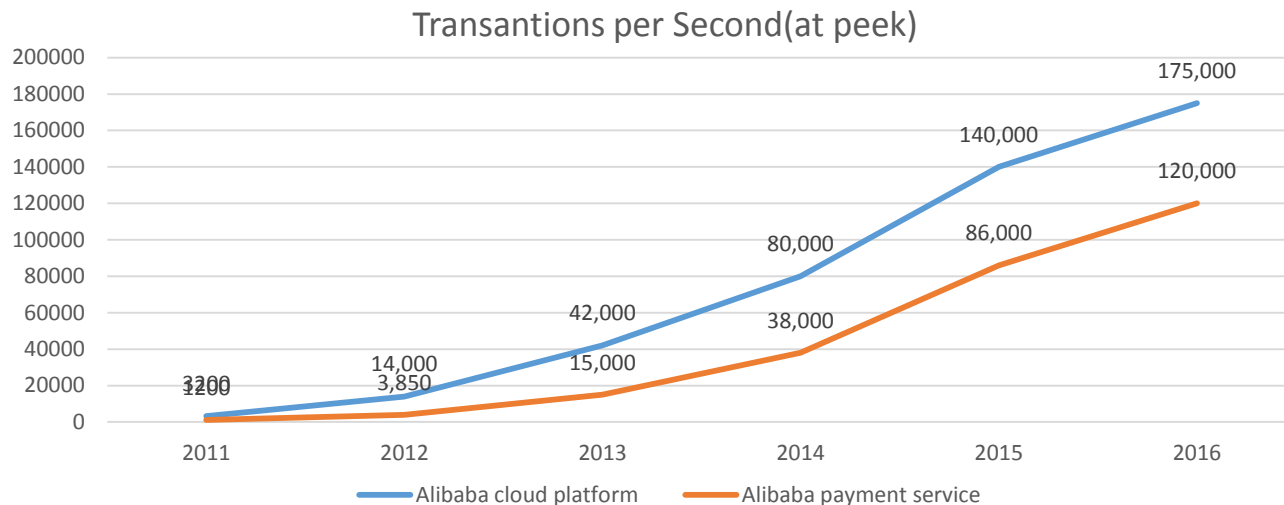
Gross Merchandise Volume(GMV) on Singles Day



- Single's Day, the world's biggest online shopping day, the total sales in 2016 reached **\$17.8 billion**
- In contrast, the total online sales from Thanksgiving, Black Friday and Cyber Monday combined in the US in 2016 is: **\$12.8 billion** (source: www.practicalcommerce.com)

Symbolized by four 1s, Nov 11 is the so called "Singles' Day" in China

China's Singles' Day(Cont.)

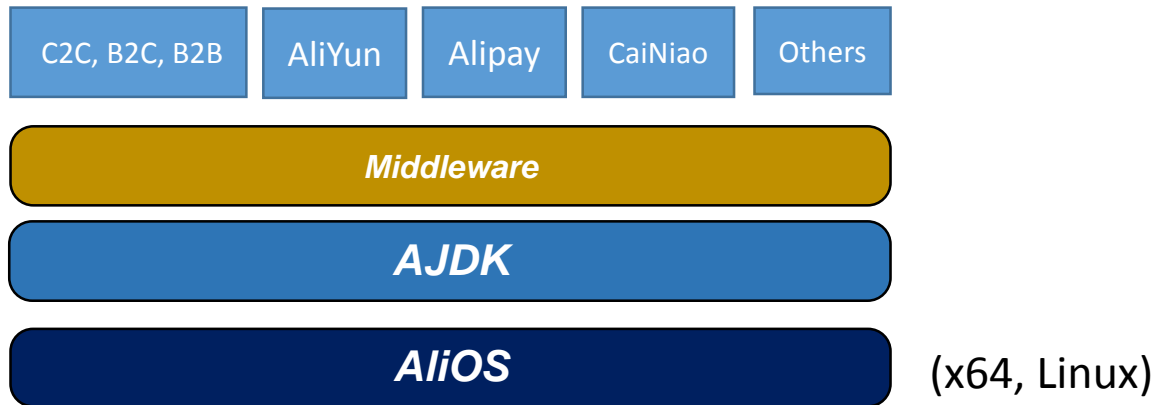


- On Singles Day in 2016, peak transactions/sec reached **175k**, and peak payment orders processed/sec reached **120k**
- In contrast, Visa can now process a peak volume of **56K messages per second**(source: www.digitaltransactions.net)

Java at Alibaba

- Running Java at massive scale
 - Million instances of JVMs, serving insurmountable number of requests every second
- Service oriented architecture
 - Services communicate with each other via RPC
 - typically, many JVMs as one cluster per service
- Heterogeneous
 - The native libraries written in C/C++ communicate with Java via JNI

Java at Alibaba(Cont.)



All the Java applications developed in Alibaba and affiliated companies, such like Alipay, CaiNiao are running on AJDK.

AJDK : Alibaba/Alipay JDK, based on OpenJDK

Java Technology we used



Apache Tomcat®



- Alibaba custom-builds most of its software based on rich Java open-source ecosystem, which are implemented for online trading, payments, logistics, and a lot of other things.

AJDK Team

- **Development**
 - Develop new features to meet our business requirements
 - Fix bugs
 - Port patches from upstream
- **Release**
 - Quarterly
 - Sync up with upstream before release
 - Current main release: JDK8/x64-linux
- **Testing**
 - Jtreg test suits
 - Our own unit test suits
 - SVT
 - A/B testing
- **Developer support**
 - Troubleshooting
 - Consultancy



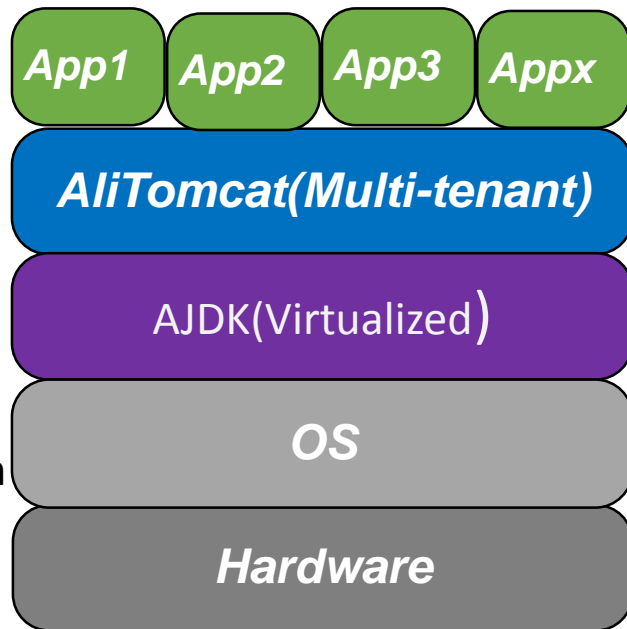
AJDK: customize OpenJDK for our own needs

- **Performance optimization and cost saving**
 - High density deployments
 - Optimize for higher throughput
 - Enhancement in JVM
 - Profile-driven application optimization
- **Reduce latency caused by GC**
- **Diagnostics tools for troubleshooting support**
 - Intrinsically designed for cloud



Tomcat/JDK extended for multitenancy

- **AliTomcat**: run multiple apps side-by-side safely
- **AJDK** allows for colocation of multiple JEE apps(as tenant) in a single instance of JVM:
 - **Isolate** application from one another
 - **Share** metadata aggressively and transparently
- **AliTomcat** + **AJDK** as infrastructure technology for high density deployment



JWarmUp: eliminate JVM warm-up

- Before JWarmup, our application owners usually use 'mock' data to warm-up JVM to let JIT optimize before actual requests come in.
- AJDK has a feature called 'JWarmup' to obviate the need for "warming-up" by:
 - **Record** the profiling data (in beta testing)
 - Let JIT **compile** code based on recorded profiling data before requests come in (in online run)

WISP: enable coroutine based async programming model

- Async programming model performs best but hard to write and maintain
- WISP enables async programming model transparently
 - Based on coroutine implementation for the HotSpot from Da Vinci Machine project
 - Yield to another coroutine when io is blocked transparently

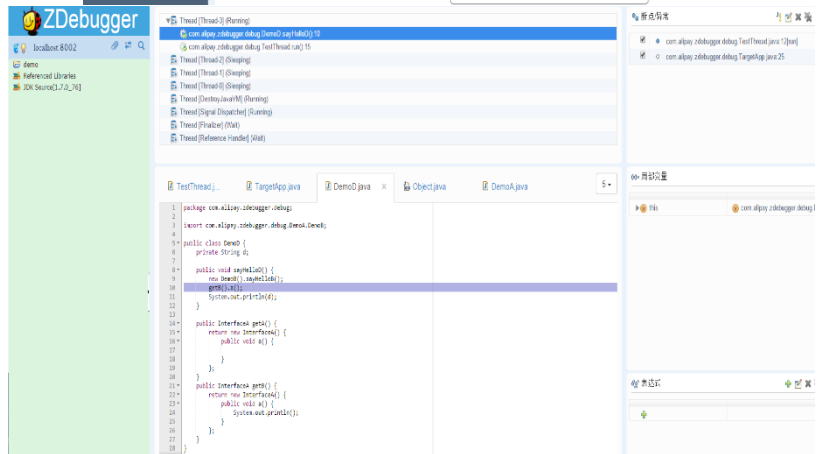
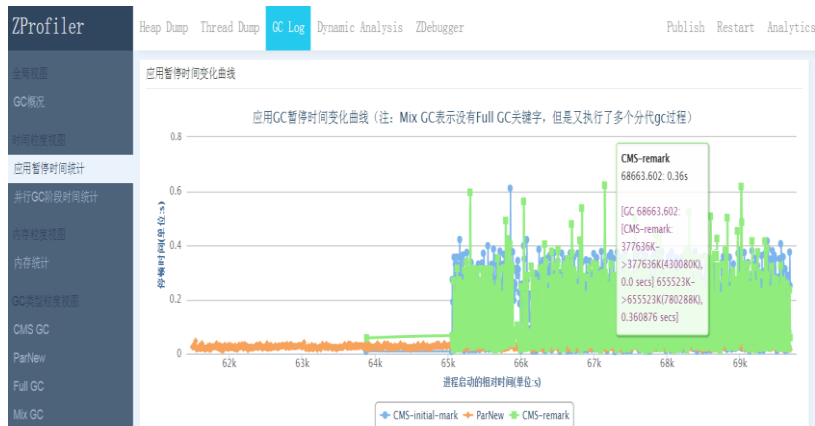
```
17 ..... SocketChannel client = SocketChannel.open(address);  
18 ..... while (client.read(buffer) != -1) {  
19 .....     buffer.flip();  
20 .....     out.write(buffer);  
21 .....     buffer.clear();  
22 ..... }
```

Yield to another available co-routine(in same thread)
transparently while read is blocked.

WISP: is the light phenomenon traditionally ascribed to ghosts

Diagnostics and Troubleshooting

- **ZProfiler**: problem and performance diagnostic tool
 - GC log analyzing
 - Low-overhead hot method profiling
 - Method tracing
- **ZDebugger**: browser-based debugging tool
 - Designed for debugging Alibaba cloud application



Alibaba and Open Source

- Alibaba has a very strong record of open source and community involvement
 - **Linux:** joined Linux foundation in last year, more involved in technology and standards
 - **MySQL:** joined the WebScaleSQL initiative which is designed for extending MySQL to its large-scale deployments
 - **Java:** open source a number of projects, including Dubbo, jStorm, RocketMQ, FastJSON, Druid, etc. some of them are donated to Apache

Alibaba and Java Community

Alibaba is willing to be deeply involved in OpenJDK community

- So far, two OpenJDK committers and another one in expert group in JSR 353.
- Would like to contribute back improvements made in AJDK to OpenJDK

As one of world's largest users of java , Alibaba will be happy to share java experiences in **online ecommerce, financial payment, logistics** to help community, influence the direction of java technology.



Q & A

Thank you



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