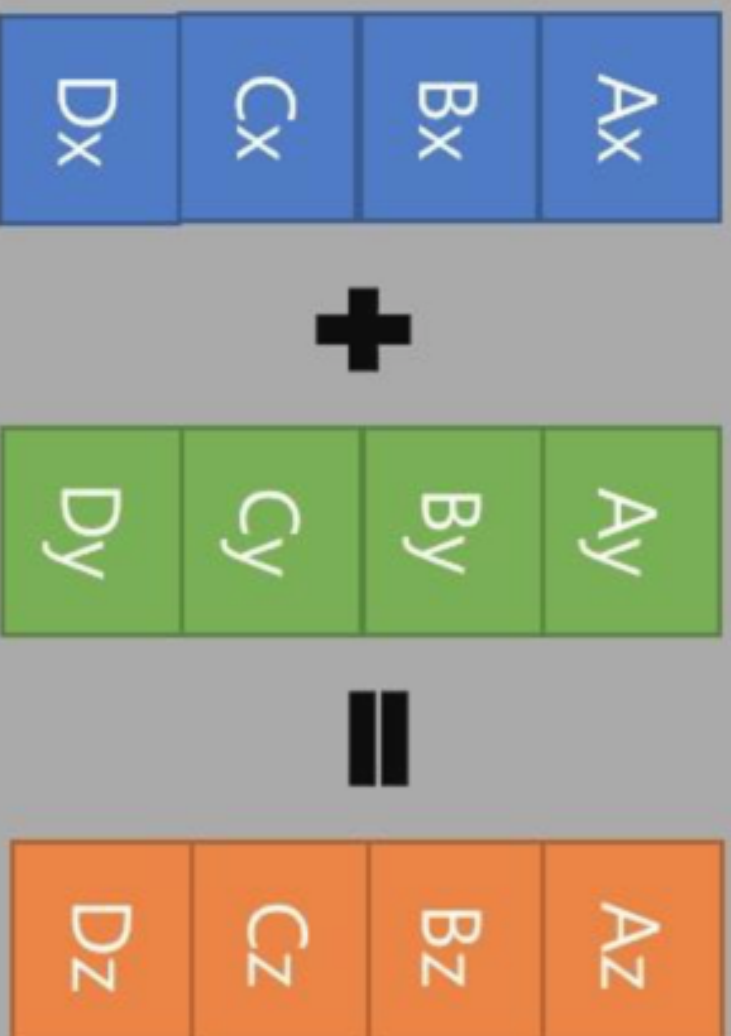# Java程序的向量化优化

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充分挖掘CPU潜力

VS

Java屏蔽底层实现

SIMD Operation of vector length 4

Vector API

- 一组可以最终调用SIMD指令的API

- JDK11->Project Panama-> Vector API

Vector API例子：余弦距离

```
float sum = 0;
float tmp = 0;
for ( int i = 0; i < a.length; i++ ) {
    tmp = a[i] − b[i];
    sum += tmp * tmp;
}
```

Vector API例子：余弦距离（Vector）

```
FloatVector<Shapes.S128Bit> l;
FloatVector<Shapes.S128Bit> r;
FloatVector<Shapes.S128Bit> tmp;
Mask mask;
for (; i + species128.length() < a.length; i+=species128.length()) {
    l = species128.fromArray(a, i);
    r = species128.fromArray(b, i);

    tmp = l.sub(r);
    tmp = tmp.mul(tmp);
    sum += tmp.addAll();
}
```

Speedup **3.3x**

Vector API in Alibaba

- OLAP数据库系统

- AI人脸识别系统

Vector API存在的问题

- 某些API的128位版本存在性能问题

- 与Jit编译器的自动Vector化冲突

资料

- 示例
- http://richardstartin.uk/vector-api-dot-product/
- 视频资料
- https://www.youtube.com/watch?v=YA9wfTrBr_4
- Vector API 源代码链接
- http://hg.openjdk.java.net/panama/dev/branches_vectorIntrinsics branch
- Vector API 总体规划
- https://bugs.openjdk.java.net/browse/JDK-8201271
- 在线文档
- https://software.intel.com/en-us/articles/vector-api-developer-program-for-java
- JEP Draft
- http://openjdk.java.net/jeps/8201271

Thanks!