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对 PHP 未来发展的一些思考

韩天峰

PHPConChina 历年完整 PPT 下载：

https://github.com/ThinkDevelopers/PHPConChina

视频回看地址：

https://www.itdks.com/Home/Act/apply?id=5366

PHPConChina 官方渠道

- 官网：http://www.phpconchina.com/?o=ppt
- 公众号：PHPCon
- 纪念品购买：https://k.weidian.com/H3=4lVho
- 客服咨询：PHPConChina （个人微信号）
- 官方QQ群： 34449228（ 加群注明 PHPCon ）

扫码关注了解行业最新动态

关于我

- 学而思网校首席架构师，基础架构部负责人
- Swoole 开源项目创始人、核心开发者
- 10 年 PHP & C/C++ 程序员

QUIC & HTTP3

```
$ ping www.taobao.com
PING www.taobao.com.danuoyi.tbcache.com (61.155.221.227): 56 data bytes
64 bytes from 61.155.221.227: icmp_seq=0 ttl=57 time=41.575 ms
64 bytes from 61.155.221.227: icmp_seq=1 ttl=57 time=26.661 ms
64 bytes from 61.155.221.227: icmp_seq=2 ttl=57 time=32.011 ms
64 bytes from 61.155.221.227: icmp_seq=3 ttl=57 time=19.793 ms
64 bytes from 61.155.221.227: icmp_seq=4 ttl=57 time=28.245 ms
64 bytes from 61.155.221.227: icmp_seq=5 ttl=57 time=35.931 ms
64 bytes from 61.155.221.227: icmp_seq=6 ttl=57 time=20.394 ms
64 bytes from 61.155.221.227: icmp_seq=7 ttl=57 time=14.487 ms
64 bytes from 61.155.221.227: icmp_seq=8 ttl=57 time=18.146 ms
64 bytes from 61.155.221.227: icmp_seq=9 ttl=57 time=48.171 ms
64 bytes from 61.155.221.227: icmp_seq=10 ttl=57 time=9.687 ms
64 bytes from 61.155.221.227: icmp_seq=11 ttl=57 time=17.870 ms
64 bytes from 61.155.221.227: icmp_seq=12 ttl=57 time=14.779 ms
64 bytes from 61.155.221.227: icmp_seq=13 ttl=57 time=56.601 ms
64 bytes from 61.155.221.227: icmp_seq=14 ttl=57 time=12.896 ms
64 bytes from 61.155.221.227: icmp_seq=15 ttl=57 time=26.382 ms
64 bytes from 61.155.221.227: icmp_seq=16 ttl=57 time=17.469 ms
64 bytes from 61.155.221.227: icmp_seq=17 ttl=57 time=62.159 ms
64 bytes from 61.155.221.227: icmp_seq=18 ttl=57 time=27.583 ms
64 bytes from 61.155.221.227: icmp_seq=19 ttl=57 time=28.528 ms
64 bytes from 61.155.221.227: icmp_seq=20 ttl=57 time=44.908 ms
64 bytes from 61.155.221.227: icmp_seq=21 ttl=57 time=46.884 ms
64 bytes from 61.155.221.227: icmp_seq=22 ttl=57 time=14.566 ms
64 bytes from 61.155.221.227: icmp_seq=23 ttl=57 time=43.202 ms
64 bytes from 61.155.221.227: icmp_seq=24 ttl=57 time=38.174 ms
64 bytes from 61.155.221.227: icmp_seq=25 ttl=57 time=29.035 ms
64 bytes from 61.155.221.227: icmp_seq=26 ttl=57 time=35.059 ms
64 bytes from 61.155.221.227: icmp_seq=27 ttl=57 time=44.881 ms
^C
--- www.taobao.com.danuoyi.tbcache.com ping statistics ---
28 packets transmitted, 28 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 9.687/30.574/62.159/13.790 ms
```

```
$ ping github.com
PING github.com (192.30.255.112): 56 data bytes
64 bytes from 192.30.255.112: icmp_seq=0 ttl=45 time=280.471 ms
64 bytes from 192.30.255.112: icmp_seq=1 ttl=45 time=300.097 ms
64 bytes from 192.30.255.112: icmp_seq=2 ttl=45 time=281.626 ms
64 bytes from 192.30.255.112: icmp_seq=3 ttl=45 time=280.407 ms
64 bytes from 192.30.255.112: icmp_seq=4 ttl=45 time=287.906 ms
64 bytes from 192.30.255.112: icmp_seq=5 ttl=45 time=276.205 ms
64 bytes from 192.30.255.112: icmp_seq=6 ttl=45 time=334.626 ms
64 bytes from 192.30.255.112: icmp_seq=7 ttl=45 time=275.754 ms
64 bytes from 192.30.255.112: icmp_seq=8 ttl=45 time=310.584 ms
64 bytes from 192.30.255.112: icmp_seq=9 ttl=45 time=293.072 ms
64 bytes from 192.30.255.112: icmp_seq=10 ttl=45 time=279.954 ms
64 bytes from 192.30.255.112: icmp_seq=11 ttl=45 time=405.666 ms
64 bytes from 192.30.255.112: icmp_seq=12 ttl=45 time=323.586 ms
64 bytes from 192.30.255.112: icmp_seq=13 ttl=45 time=306.074 ms
64 bytes from 192.30.255.112: icmp_seq=14 ttl=45 time=338.786 ms
64 bytes from 192.30.255.112: icmp_seq=15 ttl=45 time=302.687 ms
64 bytes from 192.30.255.112: icmp_seq=16 ttl=45 time=482.425 ms
Request timeout for icmp_seq 17
64 bytes from 192.30.255.112: icmp_seq=18 ttl=45 time=291.431 ms
64 bytes from 192.30.255.112: icmp_seq=19 ttl=45 time=286.769 ms
Request timeout for icmp_seq 20
64 bytes from 192.30.255.112: icmp_seq=21 ttl=45 time=305.004 ms
64 bytes from 192.30.255.112: icmp_seq=22 ttl=45 time=297.843 ms
64 bytes from 192.30.255.112: icmp_seq=23 ttl=45 time=347.862 ms
64 bytes from 192.30.255.112: icmp_seq=24 ttl=45 time=300.904 ms
Request timeout for icmp_seq 25
64 bytes from 192.30.255.112: icmp_seq=26 ttl=45 time=359.685 ms
64 bytes from 192.30.255.112: icmp_seq=27 ttl=45 time=391.588 ms
64 bytes from 192.30.255.112: icmp_seq=28 ttl=45 time=280.913 ms
64 bytes from 192.30.255.112: icmp_seq=29 ttl=45 time=281.725 ms
64 bytes from 192.30.255.112: icmp_seq=30 ttl=45 time=324.554 ms
Request timeout for icmp_seq 31
^C
--- github.com ping statistics ---
33 packets transmitted, 28 packets received, 15.2% packet loss
round-trip min/avg/max/stddev = 275.754/315.293/482.425/46.286 ms
```

网络抖动和延时

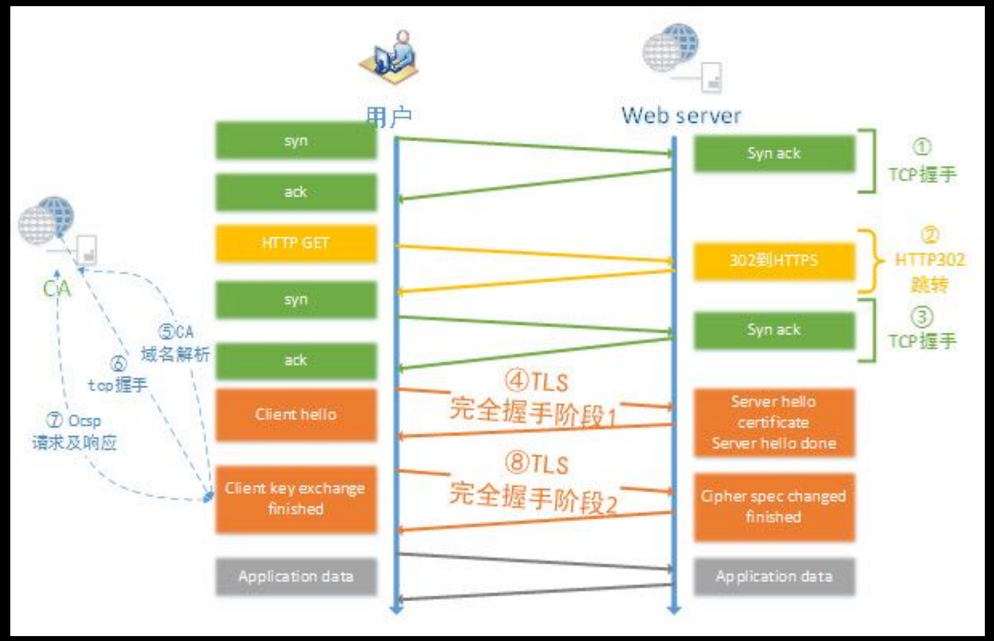
- 光速：30万公里/秒，北京-纽约：1.4万公里，光的一次往返：107ms
- 路由：48 TTL，经过 16 跳路由，每一次都需要处理时间，并且可能会丢包（15% 丢包率）
- 信号转换：光-电信转换
- 其他不可抗拒力：内容审查

TCP RTT/RTO

- TCP的超时重传：https://blog.csdn.net/whgtheone/article/details/80970292
- EstimatedRTT = 0.875 * EstimatedRTT + 0.125 * SampleRTT
- RTO = EstimatedRTT + 4 * DevRTT
- 网络抖动会引起丢包重传，2-5倍 RTT

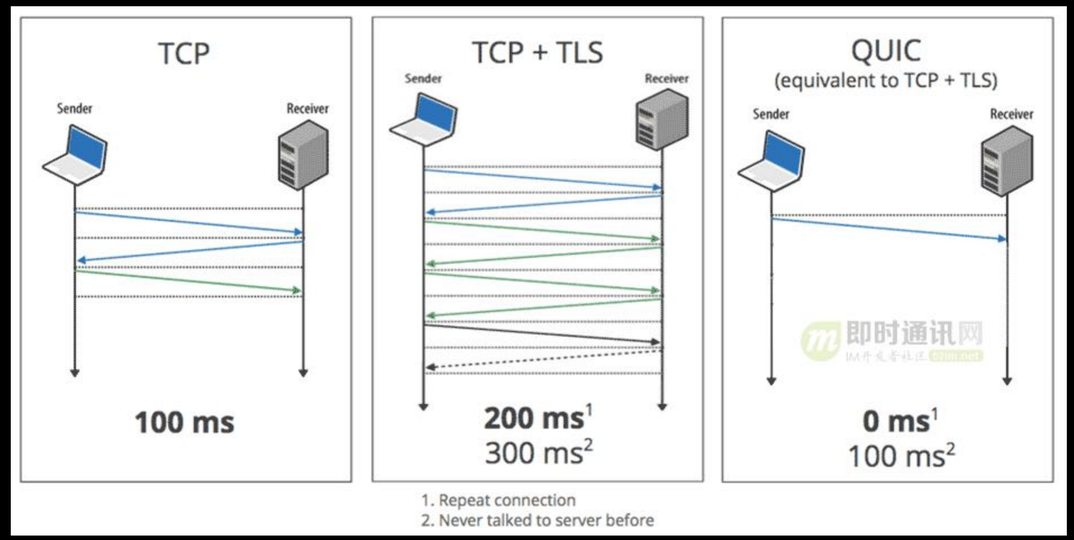
HTTPS

- TCP 握手 3次通信，1.5 RTT
- SSL/TLS 握手 4次通信，2 RTT
- HTTP 请求 & 响应，1 RTT
- 总计：4.5 RTT



QUIC

- 0-RTT/1-RTT 完成一次加密请求与响应
- IETF 标准
- HTTP3 标准
- Chrome 有 20% 流量使用 QUIC



HTTP 的通信技术发展史

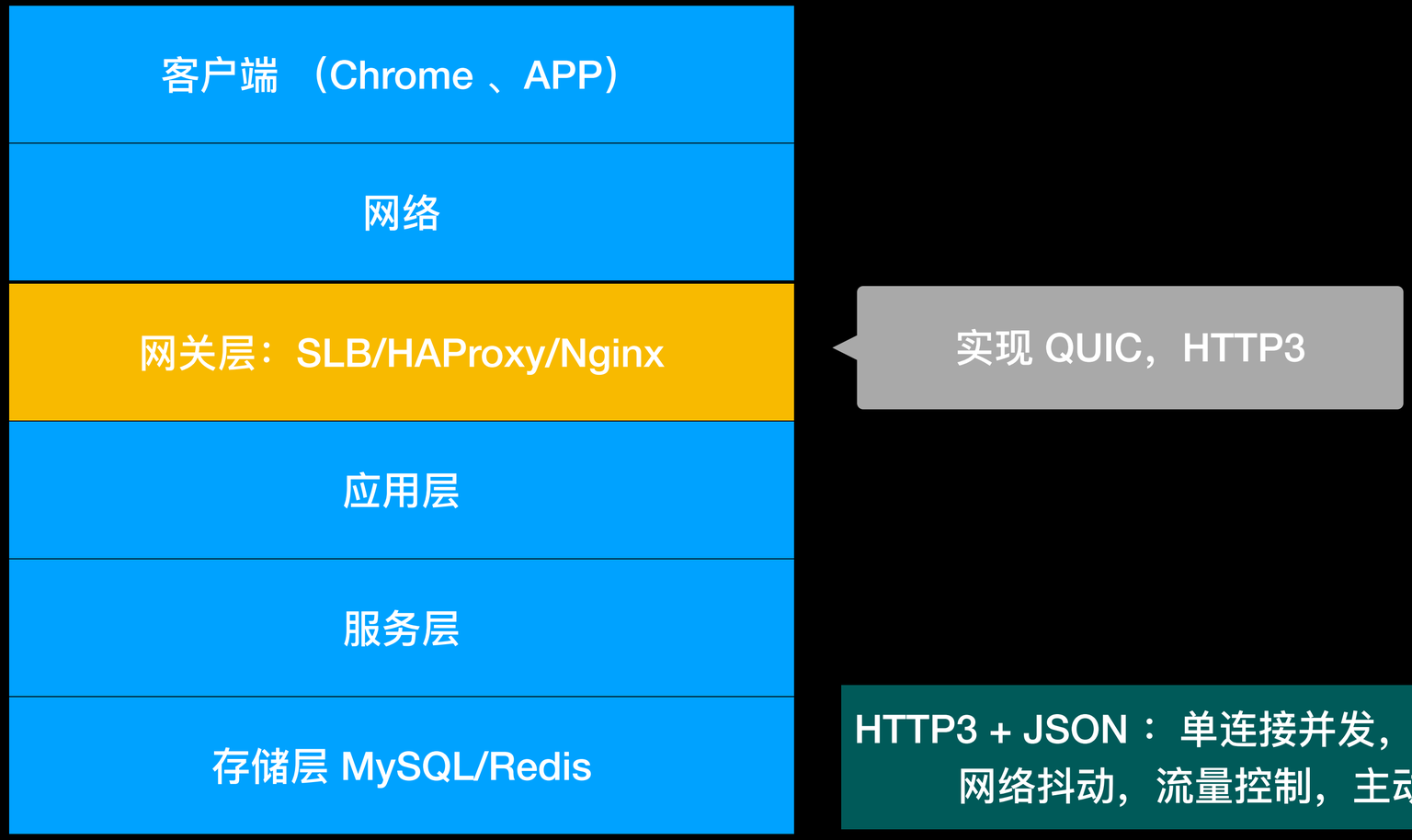
HTTP1.0	开启 Web 时代
HTTP1.1	KeepAlive
HTTP2	单连接并发
HTTP3	QUIC + HTTP2

应用场景

- HTTP3，弱网环境下也可以流畅访问了，未来3-5年内会普及
- 低延时直播，RTMP over QUIC，延时从2秒降低到 800ms
- 即时通信（QQ 和微信只是 email，不是真正的即时通信）、网络游戏、物联网（设备远程控制和通信）
- QUIC：高可靠性、低延时的网络通信

PHP 需要做什么？

Do Nothing


客户端 （Chrome 、APP）
网络
网关层：SLB/HAProxy/Nginx
应用层
服务层
存储层 MySQL/Redis
实现 QUIC，HTTP3
HTTP3 + JSON： 单连接并发，低延时，抗网络抖动，流量控制，主动推送

微服务 & 服务治理

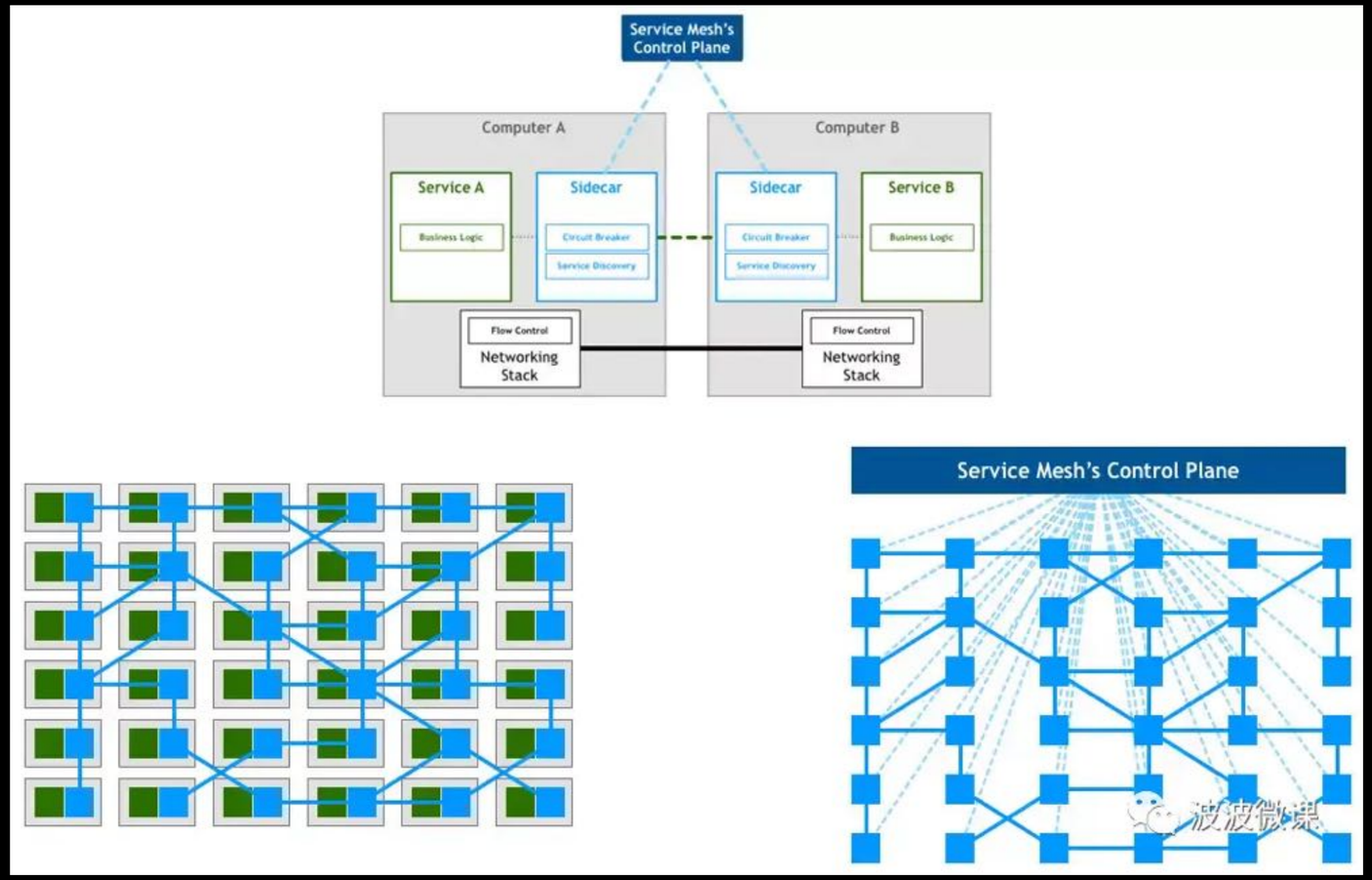
常见的 RPC 框架

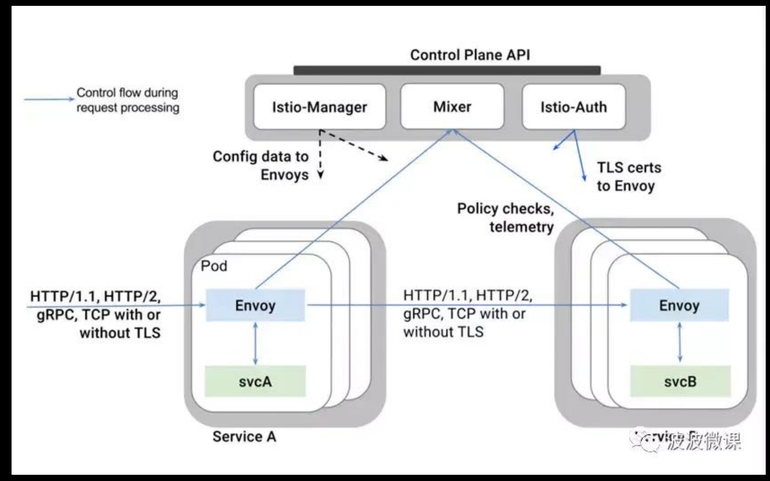
- Spring Cloud：生态最成熟，最完善，只支持 Java
- Dubbo：成熟稳定，中文社区支持好，Spring Cloud 之外的另外一个选择，只支持 Java
- GRPC：只有 RPC ，缺少整体解决方案，最接近标准，HTTP2 + ProtoBuf
- Tars：多语言支持好、配套设施完善、在腾讯有十几年的应用实践
- BRPC：技术深度最高，最专业 （知乎：@戈君）
- 其他 … Swoft、Hyperf

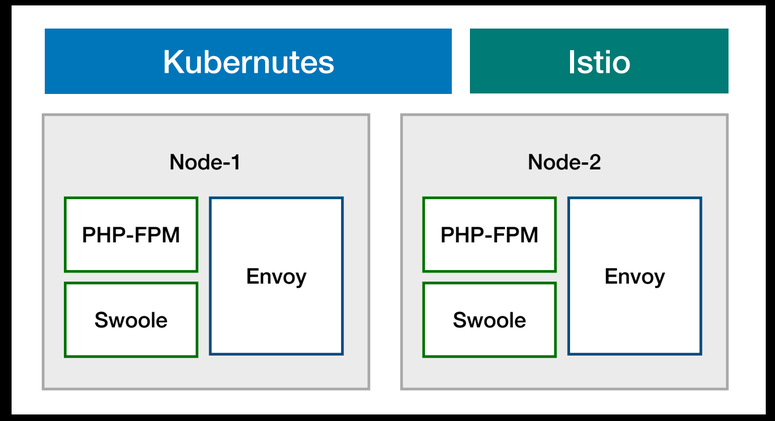
ServiceMesh & ServiceLess

Spring Cloud 向 Service Mesh 转变: https://www.cnblogs.com/bocloud/p/10895296.html

SideCar & Mesh 网格







Service Mesh 实践

- 控制面板：Istiod
- 数据面板：Envoy
- 容器编排：Kubernetes
- 元数据存储：ETCD
- 流量劫持：iptables、eBPF（Cilium）、DNS、代理模式

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PHP 如何实现 ServiceMesh？

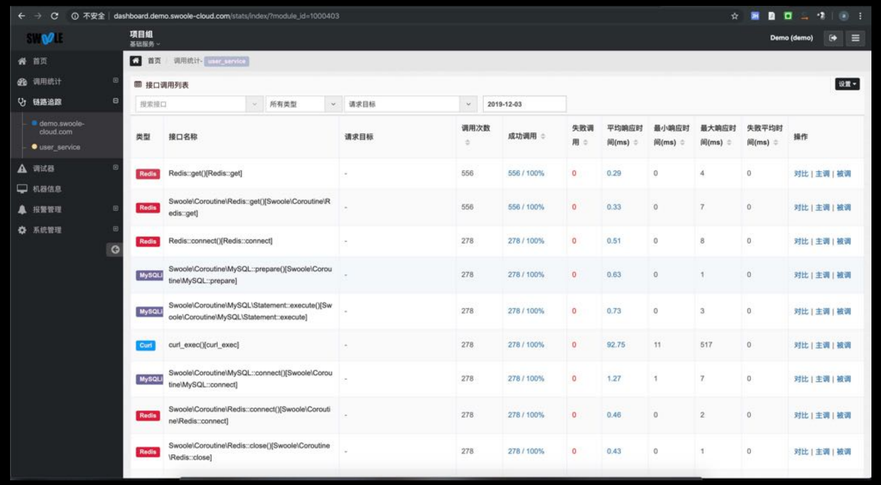
Do Nothing

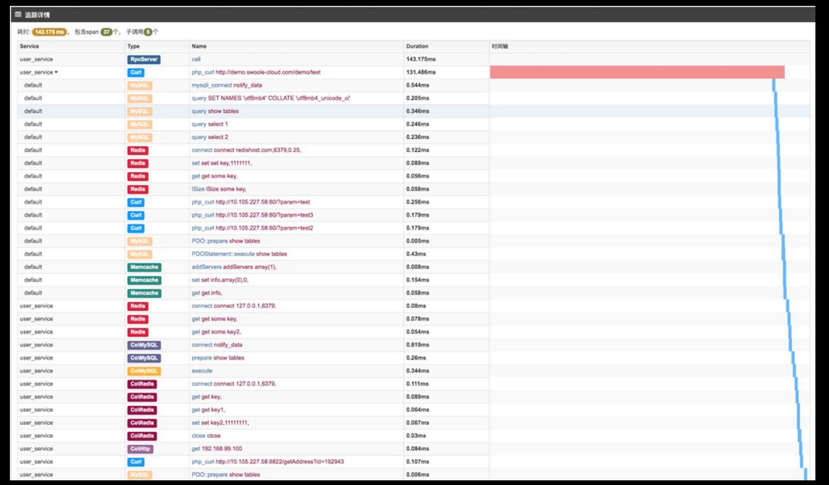
PHP & ServiceMesh

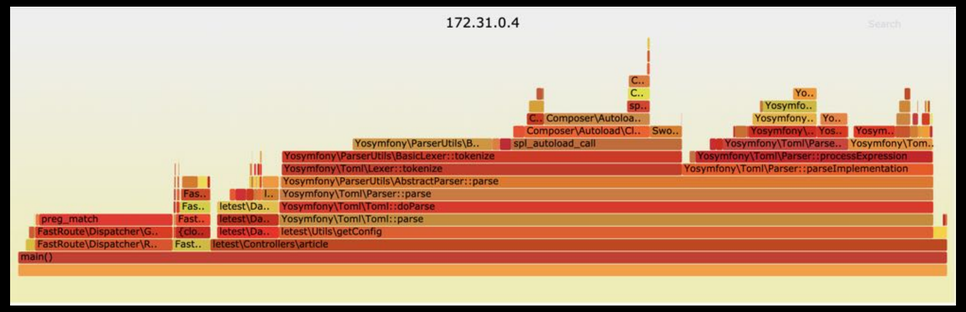
- SideCar 实现了服务发现、故障转移、流量管控、自适应限流、熔断、连接池、协议转换、代理、可观察性 等等所有服务治理的能力
- K8s 管控系统的运行，实现弹性伸缩、集群迁移、高可用、混合云架构
- PHP 应用开发者应当专注于深度理解业务、更好地实现业务逻辑，持续提升代码质量，对系统进行抽象和设计，编写单测，编写工具，编写文档，更优雅、更有效率
- PHP 内核、扩展、框架、类库，提供更丰富、更易用、更舒适、更高效的编程环境、工具
- 四层架构是20年前的理念，服务架构从二维扁平化变成三维立体化

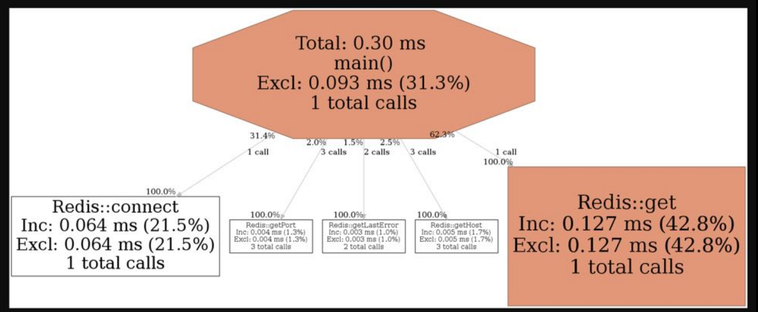
PHP 可观察性

- 调用统计：调用次数、QPS、耗时、错误码、主被调关系、拓扑图、历史同比环比、P99 & P95
- 链路追踪：Trace
- 性能分析：性能画像（Profile）、火焰图、阻塞检测、内存泄漏检测
- 推荐一下：Swoole Tracker （学而思网校核心业务大规模使用，正在推广到好未来全集团）









Use somethings, Do not develop somethings

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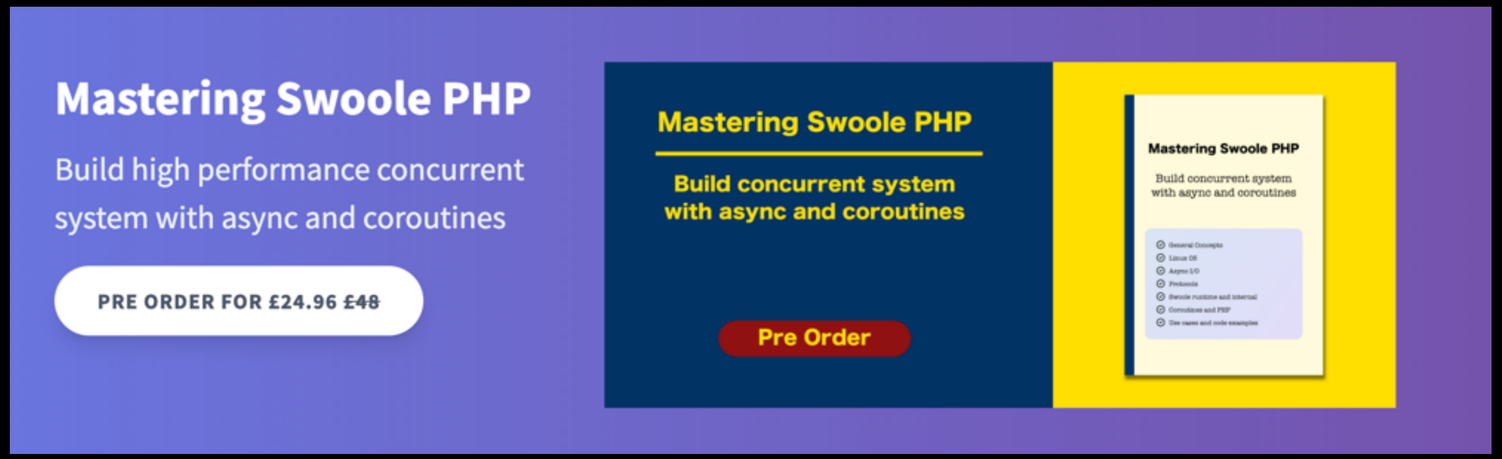
PHP8 & Swow

PHP 生态

- Laravel、Symfony、Composer、Guzzle、Phalcon、Zend-Expressive
- WordPress、MediaWiki、Drupal
- PHPStorm、Xdebug、PHPUnit
- Swoole、Hyperf、EasySwoole、MixPHP、Swoft、IMI、Saber ...
- Swoole Tracker、Swoole Compiler

Swoole

- 趋于稳定成熟，持续提升性能和稳定性
- 代码质量、代码规范、文档、测试



Swow

- 基于 libuv
- 支持 Windows 和 PHP-FPM
- 语言级别协程
- 纯 C 实现，未来考虑推动合并到 php-src
- 微内核，最小核心，library 完全使用 PHP 代码编写

PHP

- 近 20 年内无数的商业技术死亡（Delphi、VB、Flash），这些商业技术一旦无法为企业贡献价值，就会被抛弃
- PHP 没有商业公司控制，它是真正民主、开放的开源项目和社区，人人可以参与，它是生生不息的、薪火相传的、持续进化的
- PHP8、Swow
- 新生代：Nikic、Twosee

个人感悟

- Stay hungry，Stay foolish
- 空杯心态，持续学习和探索
- 对线上系统保持敬畏

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Thanks