使用Redis给短链服务加速

让Rust能尽快落地到生产环境

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分享内容

- 上节课开发的短链服务部署到生产，并进行压测，分析性能瓶颈的思路
- 在项目中使用 Redis 及组件介绍
- 使用 Redis 给短链 API 服务加速
- 压测带 Redis 的短链服务和原来对比
- 大型架构扩展的思路(通用思想)

期望公开课达到的目的

- 这个实战也是连续做了3次公开课了, 核心目的希望大家将Rust落地生产环境, 提升大家学习Rust的兴趣, 告别学习Rust始终在一个main文件里面写一些demo

- Rust用于web领域开发也是非常便利的

- 熟悉大型架构优化的通用手法

回顾一下上次公开课的内容

- 什么是短链(短地址)服务
- 接口定义
- 生产环境

什么是短链(短地址)服务

将长地址缩短到一个很短的地址, 用户访问这个短地址可以重定向到原本的长地址.
经常在微博、手机短信上看到比较短的URL

接口定义

接口1: /api/create_shortlink post请求, 将长地址转化成短地址, 并存入数据库, 接口的实现比较简单, 将长地址链接存在数据, 用数据库的自增来当成短地址

接口2: /api/delete_shortlink post请求, 删除短地址记录

接口3: /api/:id get请求, 302跳转到相应的长地址网址, 通过id查询到长地址, 并进行跳转.

接口4: /api/not_found, 找不到短地址对应的长地址, 跳转的链接

生产环境

配置信息

操作系统	Ubuntu Server 20.04 LTS 64位
CPU	2核
内存	4GB
公网带宽	1Mbps

https://www.rust-lang.org/tools/install

通过ab性能测试工具，对线上服务进行压测

输入命令

```
ab -n 100 -c 10 http://test.com/
```

其中－n表示请求数，－c表示并发数

分析性能存在的瓶颈

Redis库介绍

https://github.com/mitsuhiko/redis-rs

接口代码改进

```rust
pub async fn do_redis_connect() -> Connection {
    let client : Client = redis::Client::open( params: "redis://127.0.0.1/").unwrap();
    let mut conn : RedisResult<Connection> = client.get_async_connection().await;
    conn.unwrap()
}
```

```rust
pub fn app(pool: Pool<MySql>, redis_conn: Connection) -> Router<BoxRoute> {
    Router::new()
        .route( path: "/", svc: get(|| async { "welcome to use axum!" })) : Router<Route<...>>
        .nest( path: "/api", svc: short_links()) : Router<Nested<...>>
        .layer(AddExtensionLayer::new( value: pool)) : Router<Layered<AddExtension<...>>>
        .layer(AddExtensionLayer::new( value: Arc::new( data: redis_conn))) : Router<Layered<AddExtension<...>>>
        .layer(tower_http::trace::TraceLayer::new_for_http()) : Router<Layered<Trace<...>>>
        .boxed()
}
```

接口代码改进

```rust
pub async fn get_shortlink(
    extract::Path(id): extract::Path<i32>,
    req: Request<Body>
) -> impl IntoResponse {
    let mut url :&str = "/api/not_found";
    let pool :&Pool<MySql> = req.extensions().get::<Pool<MySql>>().unwrap();
    let mut conn :&Arc<Connection> = req.extensions().get::<Arc<Connection>>().unwrap();
    let url: String = conn.get( key: String::from( s: "url_") + &*id.to_string()).unwrap();
    // match shortlink::get_shortlink(pool, id).await {
    //     Ok(record) => {
    //         url = Box::leak(record.url.into_boxed_str());
    //     }
    //     Err(err) => {
    //         println!("err = {:#?}", err);
    //     }
    // }
    let mut headers :HeaderMap = HeaderMap::new();
    headers.insert( key: LOCATION, val: url.parse().unwrap());
    (StatusCode::FOUND, headers, ())
}
```

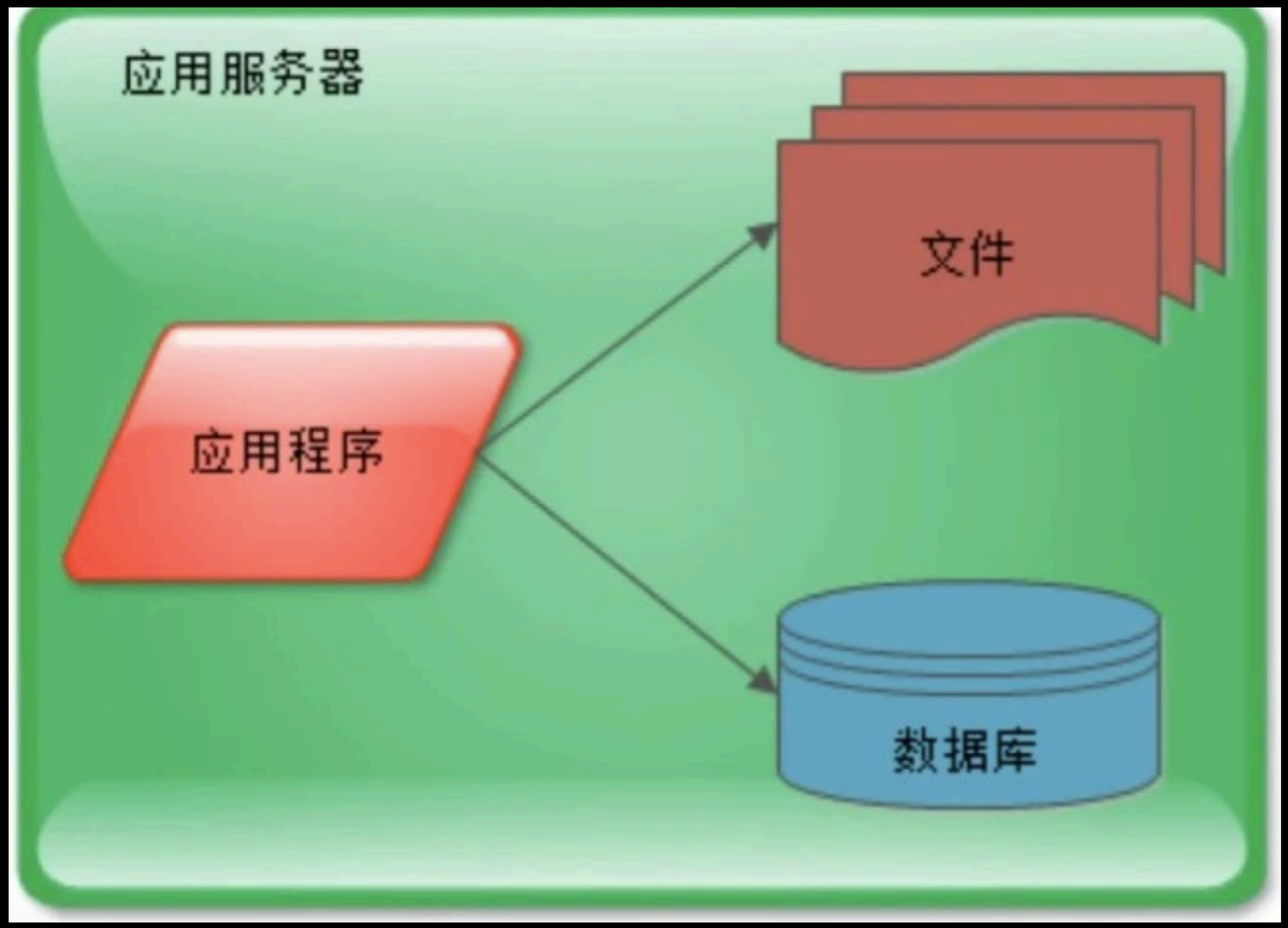
压测带Redis的短链服务

```
Server Software:
Server Hostname:        127.0.0.1
Server Port:            3000

Document Path:          /api/25
Document Length:        0 bytes

Concurrency Level:      1000
Time taken for tests:   3.290 seconds
Complete requests:      10000
Failed requests:        0
Non-2xx responses:      10000
Total transferred:      1450000 bytes
HTML transferred:       0 bytes
Requests per second:    3039.92 [#/sec] (mean)
Time per request:       328.956 [ms] (mean)
Time per request:       0.329 [ms] (mean, across all concurrent requests)
Transfer rate:          430.43 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0   45 203.0      0    1034
Processing:    18  255  46.6    258     394
Waiting:        1  255  46.7    258     394
Total:         37  301 209.0    260    1364

Percentage of the requests served within a certain time (ms)
  50%    260
  66%    283
  75%    287
  80%    291
  90%    313
  95%    344
  98%   1284
  99%   1311
 100%   1364 (longest request)
```

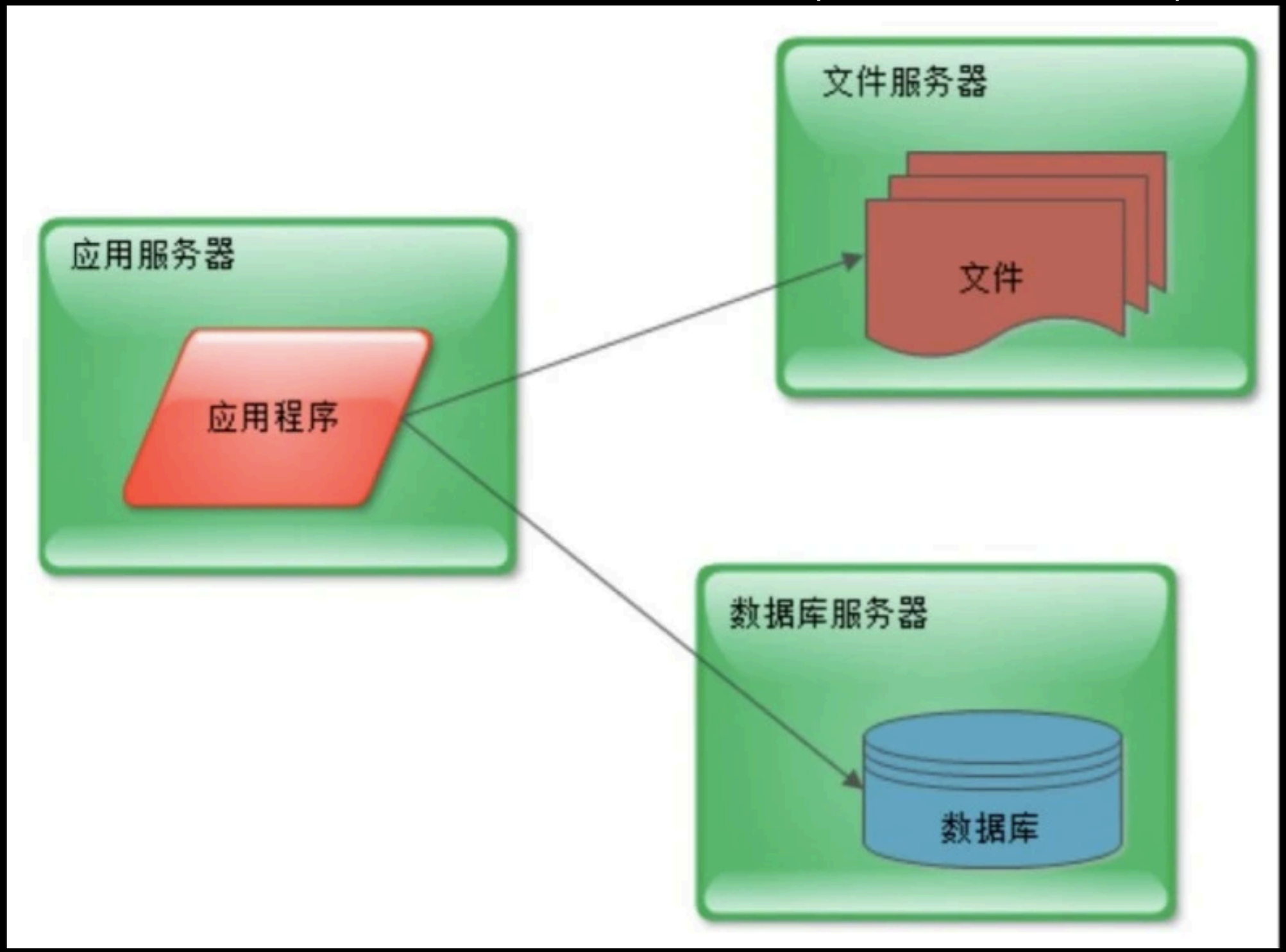
Mysql

```
Server Software:
Server Hostname:        127.0.0.1
Server Port:            3000

Document Path:          /api/10
Document Length:        0 bytes

Concurrency Level:      1000
Time taken for tests:   0.989 seconds
Complete requests:      10000
Failed requests:        0
Non-2xx responses:      10000
Total transferred:      1450000 bytes
HTML transferred:       0 bytes
Requests per second:    10113.02 [#/sec] (mean)
Time per request:       98.882 [ms] (mean)
Time per request:       0.099 [ms] (mean, across all concurrent requests)
Transfer rate:          1432.07 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        0    3   4.2      1      24
Processing:     3   25   7.3     26      58
Waiting:        0   24   7.5     26      58
Total:          7   27   6.5     28      66

Percentage of the requests served within a certain time (ms)
  50%     28
  66%     29
  75%     30
  80%     30
  90%     34
  95%     39
  98%     45
  99%     52
 100%     66 (longest request)
```

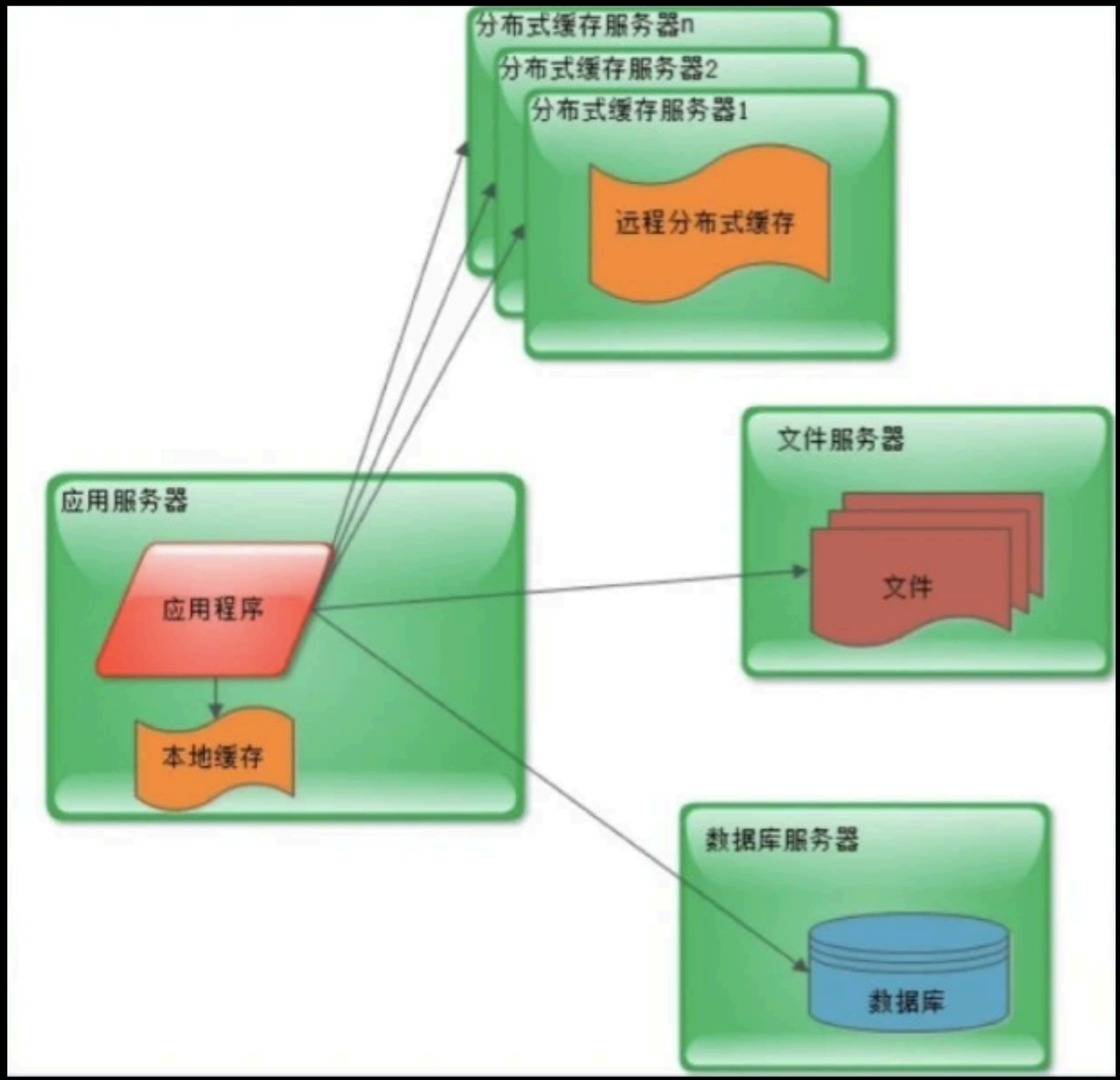
大型架构扩展的通用思路



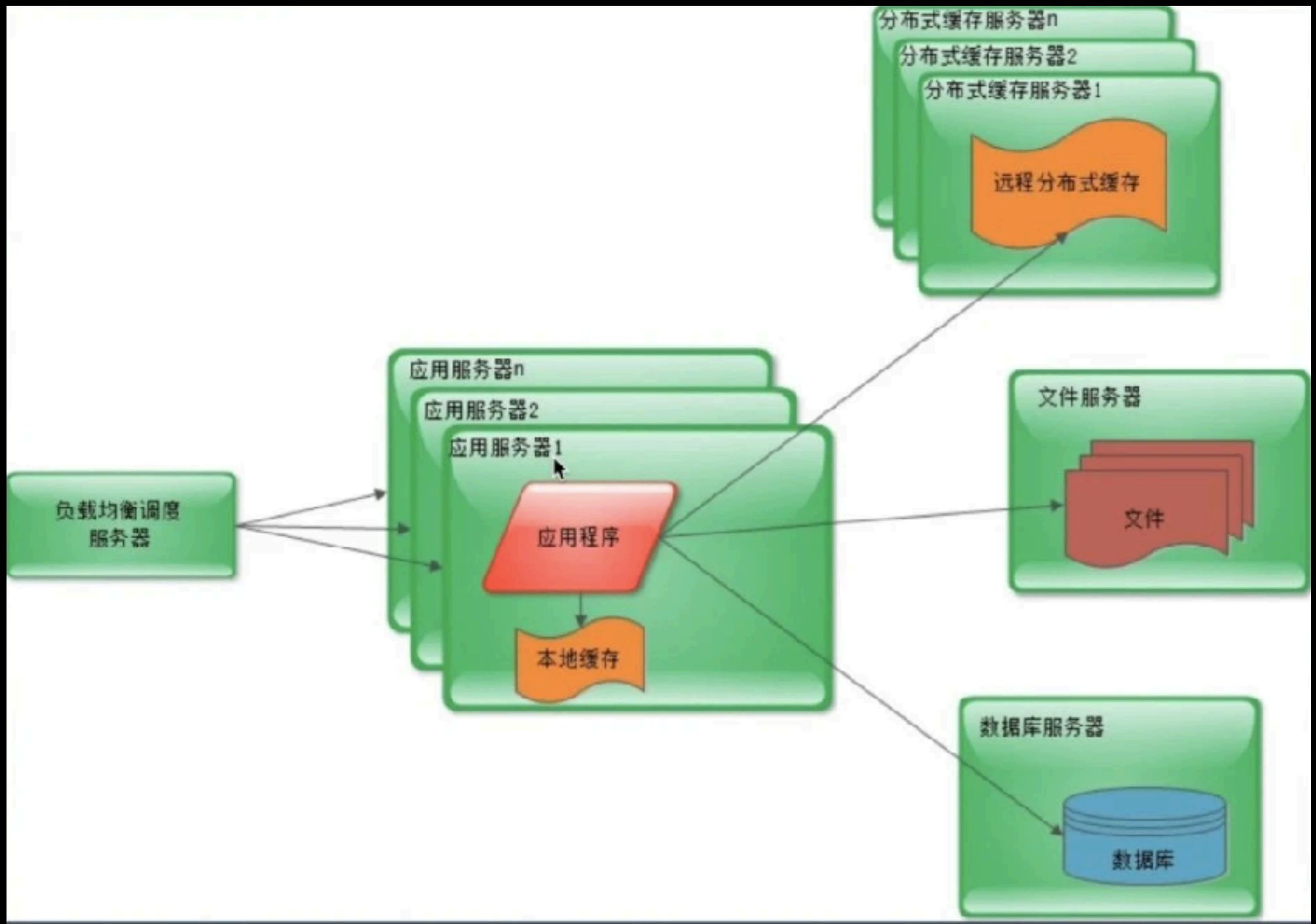
演进第一阶段: 应用、数据分离 (运维直接搞了)



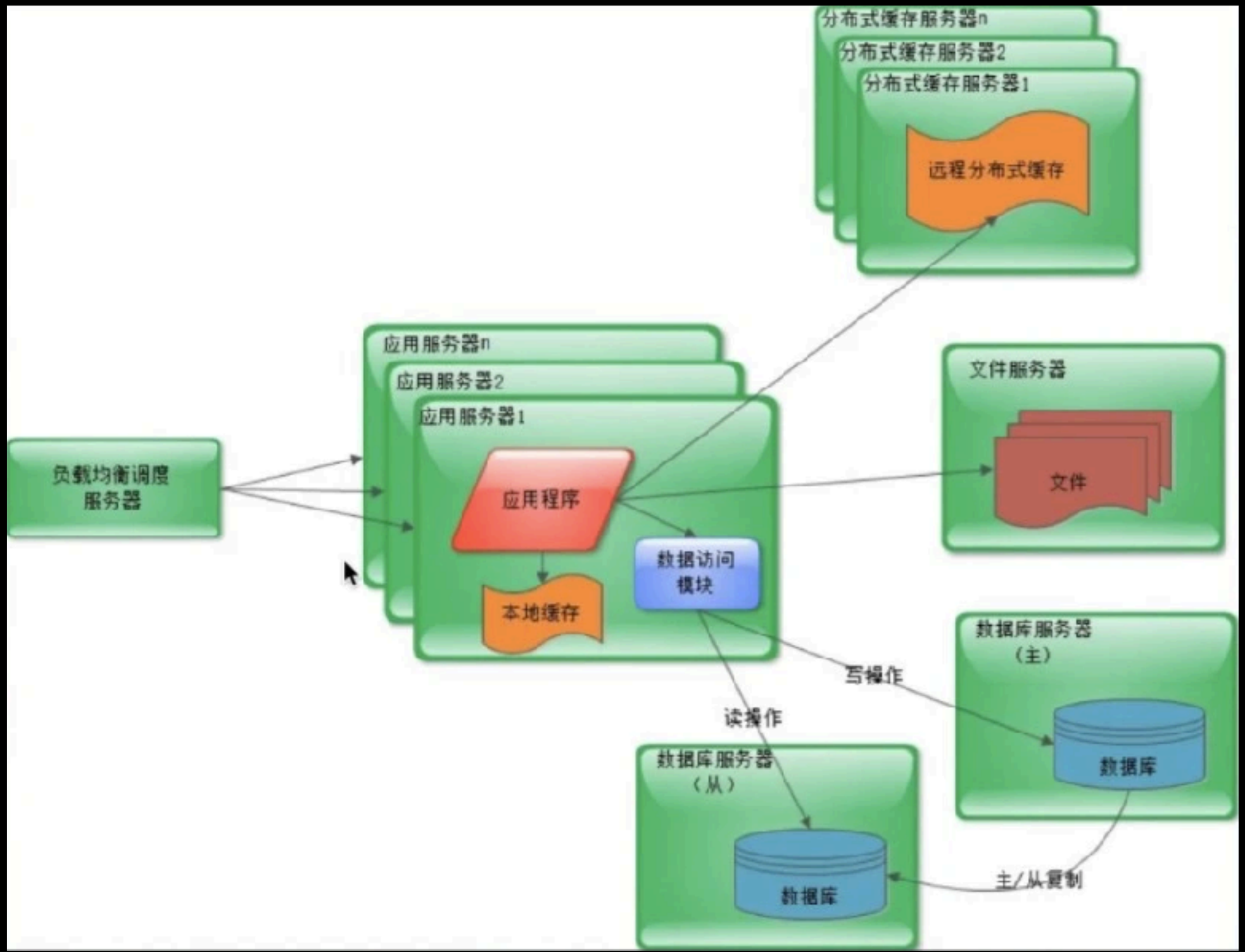
演进第二阶段: 使用缓存改善性能



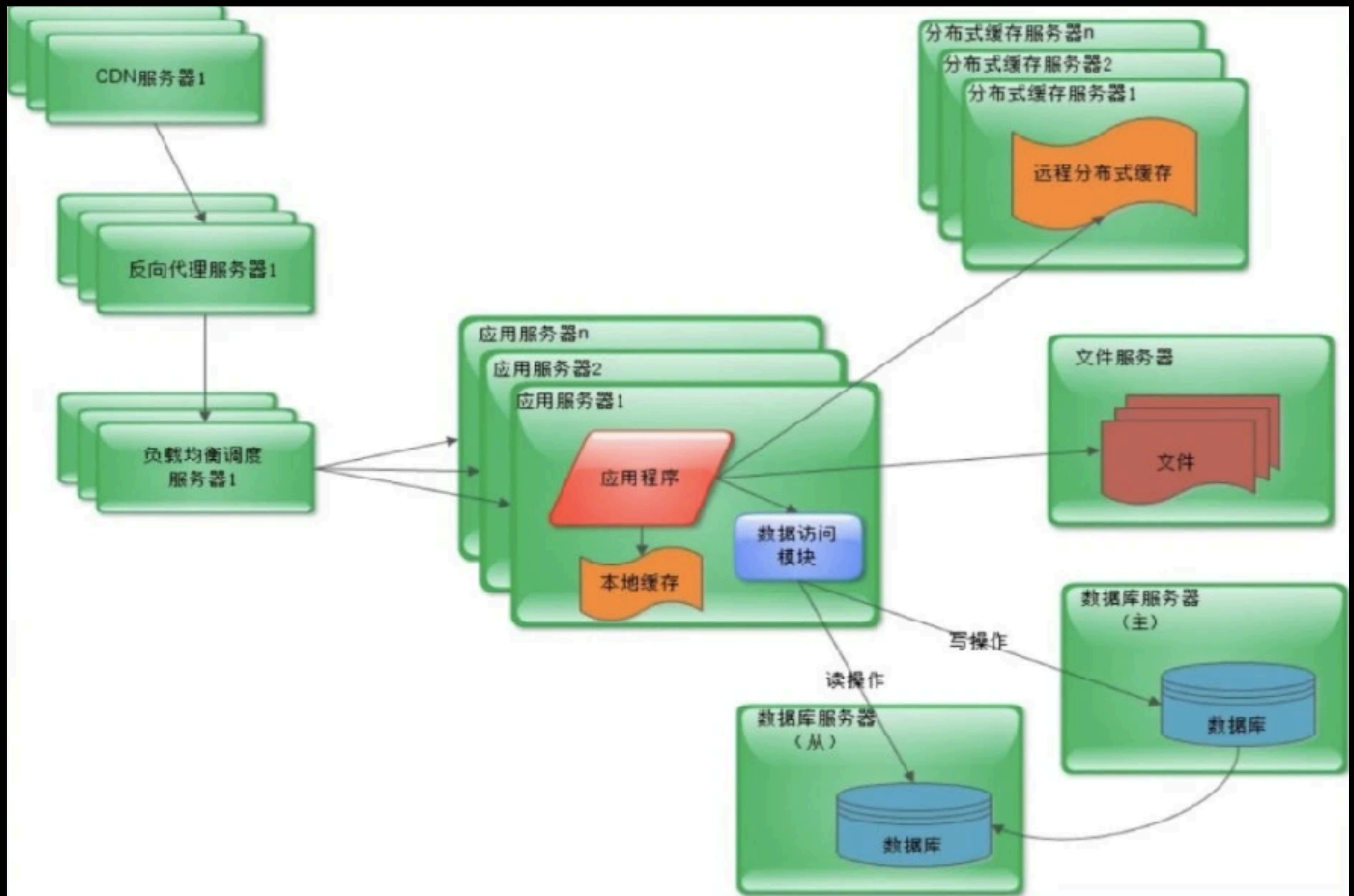
演进第三阶段: 使用应用服务器集群改善



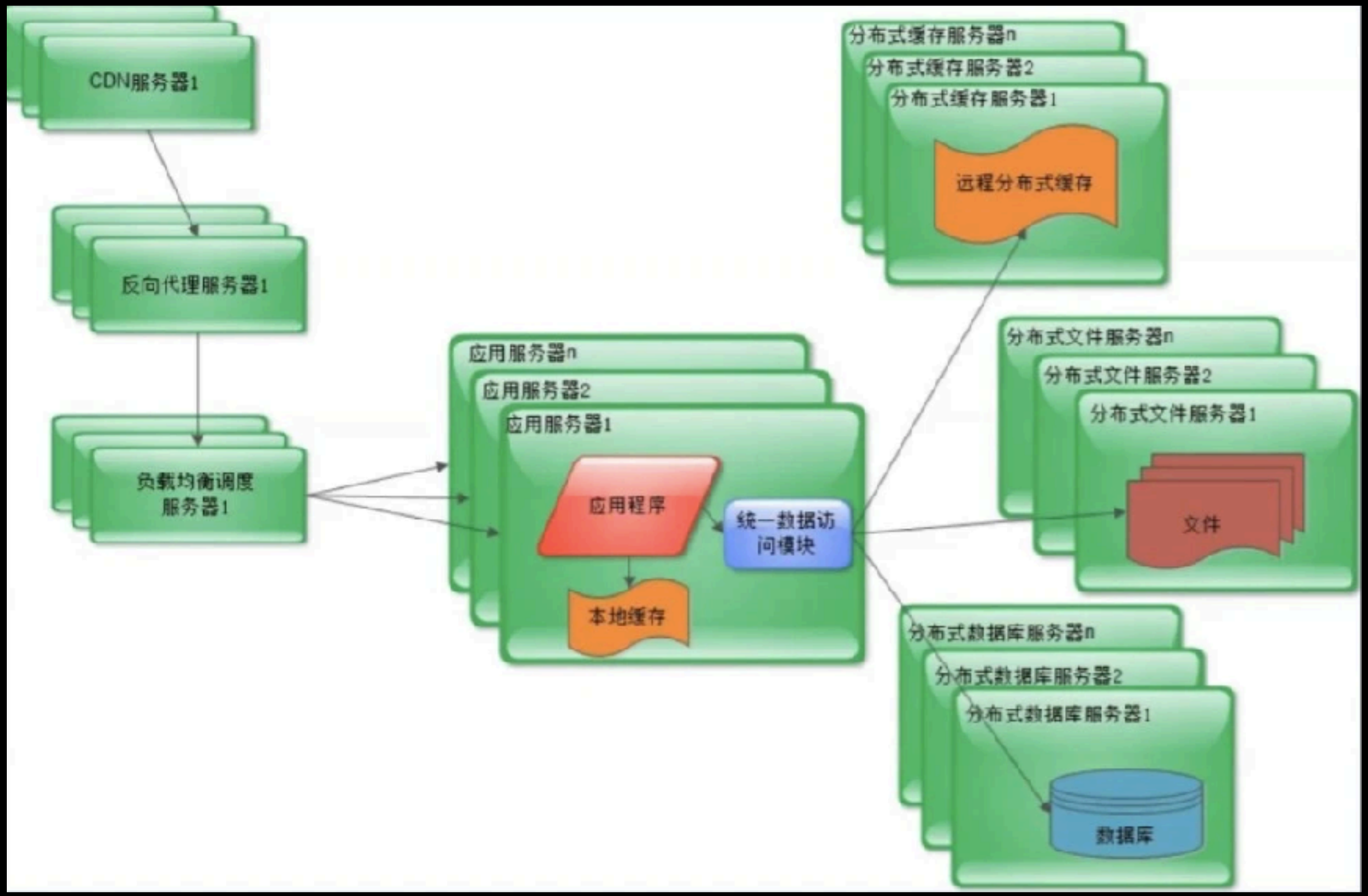
演进第四阶段: 数据库读写分离



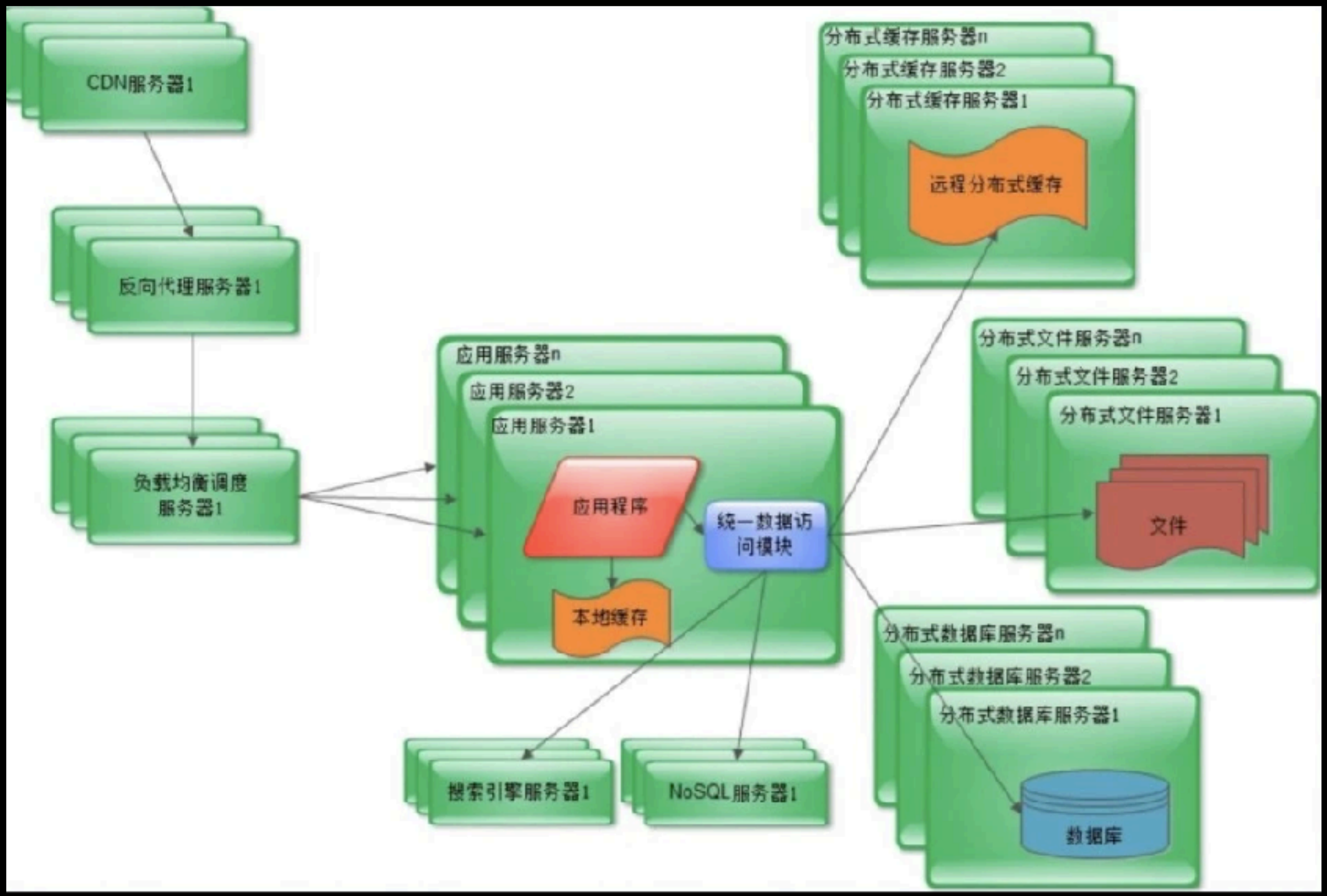
演进第五阶段: 使用反向代理和CDN加速网站



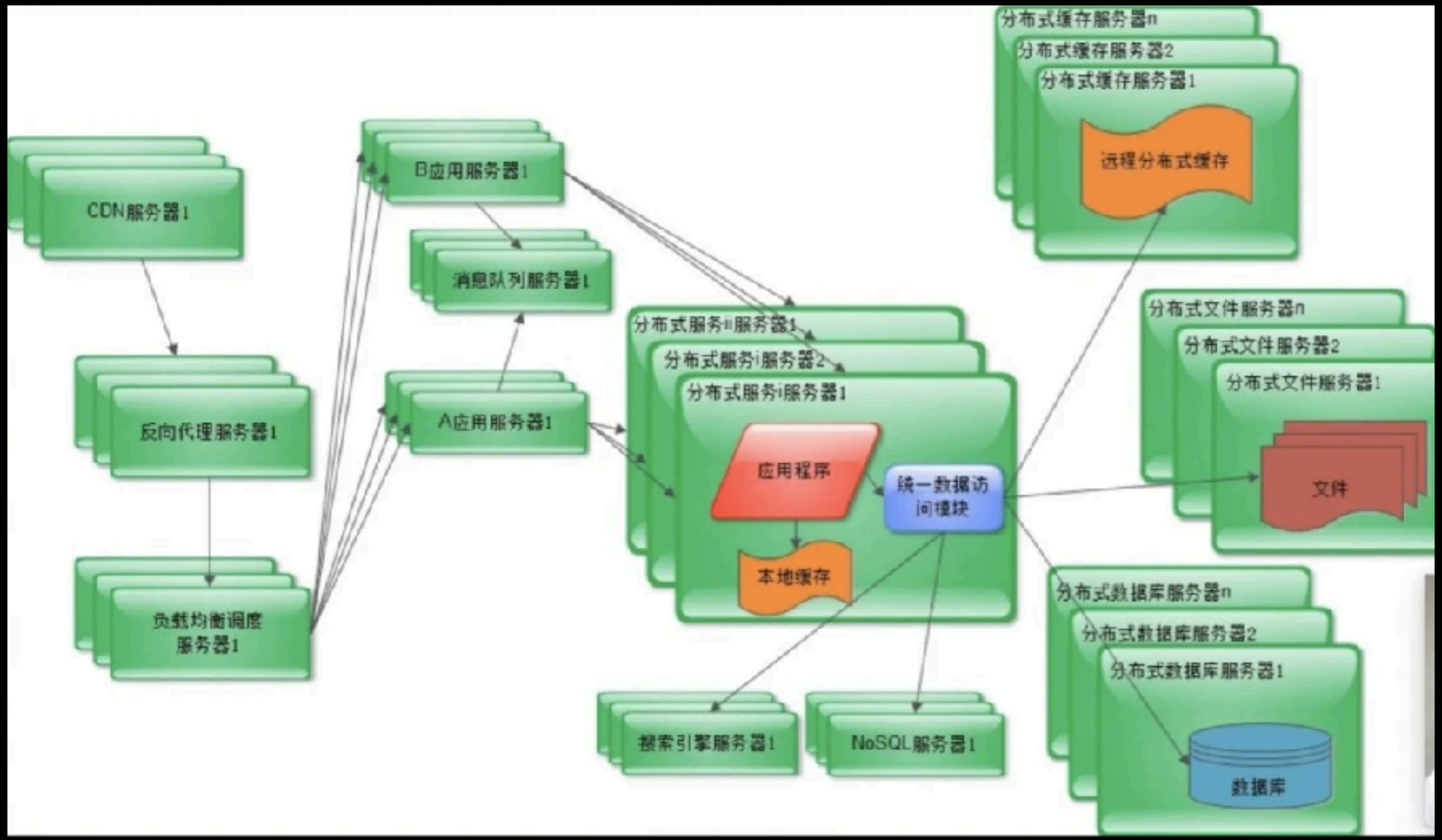
演进第六阶段: 分布式文件系统和分布式数据库



演进第七阶段: 将数据构建到搜索引擎中



演进第八阶段: 微服务及中台化



QA环节

加群一起交流Rust & Datafuse

Datafuse Rust语言中文社区 知数堂 zhishuteng.com