

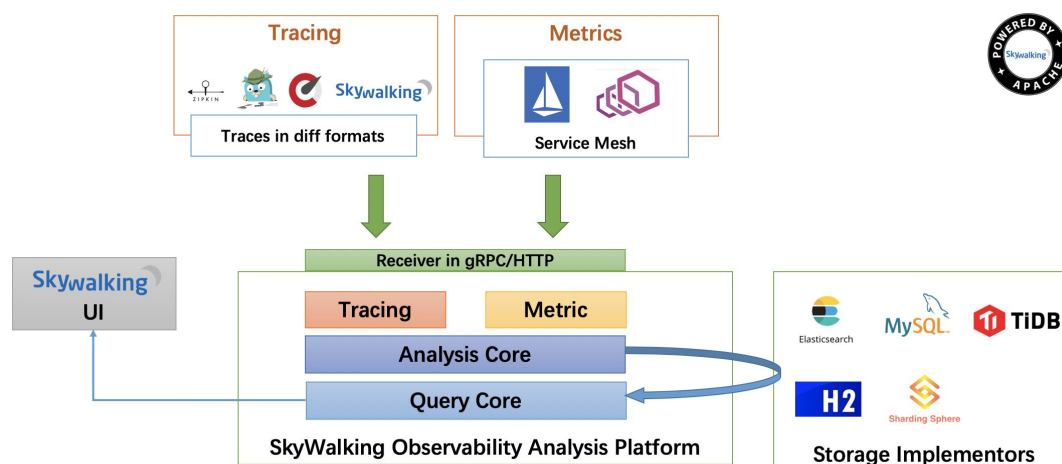
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有道笔记地址: <https://note.youdao.com/s/SLiJ0MvI>

## 1. 接入 Skywalking

### 1) 搭建 Skywalking OAP 服务

参考微服务专题 Skywalking 课程



### 2) 微服务配置 Skywalking Agent

以 tulingmall-member 为例, 在 jvm 参数中增加 agent 配置

```
-javaagent:D:\apache\apache-skywalking-java-agent-8.11.0\skywalking-agent\skywalking-agent.jar
```

```
-Dskywalking.agent.service_name=tulingmall-member
```

```
-Dskywalking.collector.backend_service=192.168.65.103:11800
```

访问 Skywalking UI : <http://192.168.65.103:8080/>

### 3) 集成日志框架, 生成 traceId

[logback 官方配置](#)

引入依赖

```
<!-- apm-toolkit-logback-1.x -->
<dependency>
  <groupId>org.apache.skywalking</groupId>
  <artifactId>apm-toolkit-logback-1.x</artifactId>
  <version>8.9.0</version>
</dependency>
```

添加 logback 日志文件 logback-spring.xml

```
<?xml version="1.0" encoding="UTF-8"?>
```

```

<configuration>

    <!-- 引入 Spring Boot 默认的 logback XML 配置文件 -->
    <include resource="org/springframework/boot/logging/logback/defaults.xml"/>

    <!-- 控制台 Appender -->
    <appender name="console" class="ch.qos.logback.core.ConsoleAppender">
        <!-- 日志的格式化 -->
        <encoder class="ch.qos.logback.core.encoder.LayoutWrappingEncoder">
            <layout
class="org.apache.skywalking.apm.toolkit.log.logback.v1.x.TraceIdPatternLogbackLayout">
                <Pattern>%d{yyyy-MM-dd HH:mm:ss.SSS} %-
5level %tid %t %logger{36}: %msg%n</Pattern>
            </layout>
        </encoder>
    </appender>

    <!-- 从 Spring Boot 配置文件中，读取 spring.application.name 应用名 -->
    <springProperty          name="applicationName"          scope="context"
source="spring.application.name" />

    <!-- 日志文件 Appender -->
    <appender name="file" class="ch.qos.logback.core.rolling.RollingFileAppender">
        <!-- 日志文件的路径 -->
        <file>/logs/tulingmall/${applicationName}.log</file>
        <!--滚动策略，基于时间 + 大小的分包策略 -->
        <rollingPolicy class="ch.qos.logback.core.rolling.TimeBasedRollingPolicy">
            <fileNamePattern>/logs/tulingmall/${applicationName}-${d{yyyy-MM-dd}-
%i.log</fileNamePattern>
            <MaxHistory>20</MaxHistory>
            <timeBasedFileNamingAndTriggeringPolicy
class="ch.qos.logback.core.rolling.SizeAndTimeBasedFNATP">
                <maxFileSize>500MB</maxFileSize>
            </timeBasedFileNamingAndTriggeringPolicy>
        </rollingPolicy>
        <!-- 日志的格式化 -->
        <encoder class="ch.qos.logback.core.encoder.LayoutWrappingEncoder">
            <layout
class="org.apache.skywalking.apm.toolkit.log.logback.v1.x.TraceIdPatternLogbackLayout">
                <!-- 日志格式中添加 %tid 即可输出 trace id -->
                <Pattern>%d{yyyy-MM-dd HH:mm:ss.SSS} %-
5level %tid %t %logger{36}: %msg%n</Pattern>
            </layout>
        </encoder>

```

```

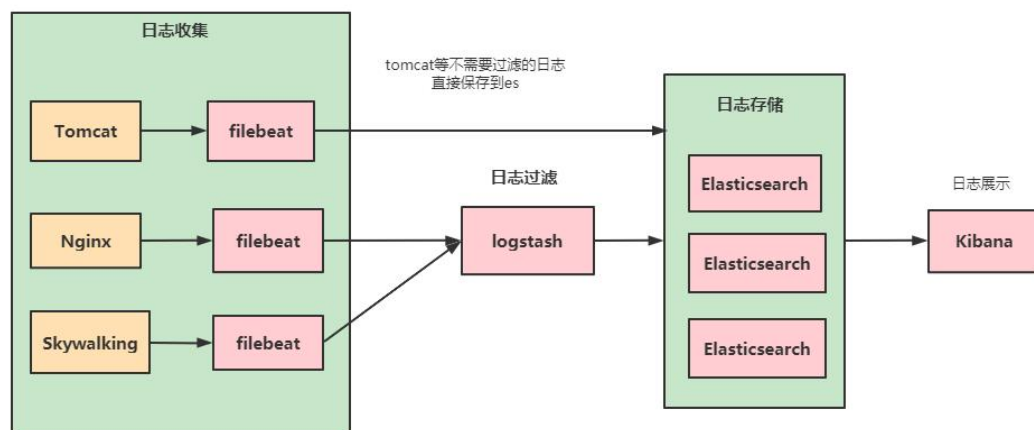
</appender>

<!-- 设置 Appender -->
<root level="DEBUG">
    <appender-ref ref="console"/>
    <appender-ref ref="file"/>
</root>

</configuration>

```

## 2. 整合 ELK 收集微服务链路日志



### 方案一：使用 logstash 日志插件

#### 1) 引入依赖

```

<dependency>
    <groupId>net.logstash.logback</groupId>
    <artifactId>logstash-logback-encoder</artifactId>
    <version>6.3</version>
</dependency>

```

#### 2) logback-spring.xml 中添加 logstash 配置

```

<!-- add converter for %tid -->
<conversionRule                                conversionWord="tid"
converterClass="org.apache.skywalking.apm.toolkit.log.logback.v1.x.LogbackPatternConverter"/
>
<!-- add converter for %sw_ctx -->
<conversionRule                                conversionWord="sw_ctx"
converterClass="org.apache.skywalking.apm.toolkit.log.logback.v1.x.LogbackSkyWalkingContext
PatternConverter"/>

```

```

<appender name="LOGSTASH"
class="net.logstash.logback.appender.LogstashTcpSocketAppender">
  <destination>192.168.65.25:9527</destination>
  <encoder class="net.logstash.logback.encoder.LoggingEventCompositeJsonEncoder">
    <providers>
      <timestamp>
        <timeZone>UTC</timeZone>
      </timestamp>
      <pattern>
        <pattern>
          {
            "level": "%level",
            "tid": "%tid",
            "skyWalkingContext": "%sw_ctx",
            "thread": "%thread",
            "class": "%logger{1.}:%L",
            "message": "%message",
            "stackTrace": "%exception{10}"
          }
        </pattern>
      </pattern>
    </providers>
  </encoder>
</appender>

<!-- 设置 Appender -->
<root level="INFO">
  <appender-ref ref="LOGSTASH"/>
</root>

```

### 3) 添加 tulingmall-logstash.conf 配置，启动 logstash

```

input {
  tcp {
    # 在 9527 端口接收 logback 传来的日志
    host => "0.0.0.0"
    port => 9527
    mode => "server"
    tags => ["tulingmall"]
    codec => json_lines
  }
}
filter {
}
output {
  #控制台输出

```

```

    stdout { codec => rubydebug }
    #输出到 es
    elasticsearch {
      hosts => ["127.0.0.1:9200"]
      user => "elastic"
      password => "123456"
      index => "tulingmall-%{+YYYY.MM.dd}"
    }
  }
}

```

启动 logstash

```

bin/logstash -f tulingmall-logstash.conf --config.reload.automatic
# 后台启动
nohup bin/logstash -f tulingmall-logstash.conf >/dev/null 2>tulingmall.log &

```

## 方案二：标准的 ELK 收集方案：通过 FileBeat 收集本地日志

### 1) 启动 FileBeat 收集本地日志

修改 filebeat.yml 的配置，指定日志收集地址和 logstash 地址

```

filebeat.inputs:
- type: log
  enabled: true
  paths:
    - f:\logs\tulingmall\*.log
  multiline.pattern: '^\\d{4}\\-\\d{2}\\-\\d{2}s\\d{2}\\:\\d{2}\\:\\d{2}\\\\.\\d{3}'
  multiline.negate: true
  multiline.match: after
#----- Logstash output -----
output.logstash:
  hosts: ["192.168.65.220:5044"]

```

启动 FileBeats

```

#启动 FileBeats
filebeat.exe -e -c filebeat.yml

```

### 2) Logstash 解析 Trace ID

通过 grok 自定义正则表达式，可以从日志行中抽取出 trace id，就可以在 es 中建立索引，方便日志检索。使用 (?<trace\_id>[0-9a-f.]{53,54}) 即可抽取出 trace id。

2 hits						
time	level	trace_id	thread	content	log.file.path	
> 2021-06-17 15:19:59.237	ERROR	812f0a005c1245c0b2cb0adcc754_91.16239143992210013	http-nio-8877-exec-3	Servlet.service() for servlet [dispatcherServlet] in context with path [] threw exception [Request processing failed; nested exception is feign.FeignException\$InternalServerError: status 500 reading CouponsFeignService#list(Integer,Long)] with root cause feign.FeignException\$InternalServerError: status 500 reading CouponsFeignService#list(Integer,Long) at feign.FeignException.errorStatus(FeignException.java:114) at feign.FeignException.errorStatus(FeignException.java:86)	f:\logs\tulingmall	\tulingmall-member.log
> 2021-06-17 15:19:59.233	ERROR	812f0a005c1245c0b6a5b2cb0adcc754_91.16239143992210013	http-nio-8855-exec-7	Servlet.service() for servlet [dispatcherServlet] in context with path [] threw exception [Request processing failed; nested exception is java.lang.IllegalArgumentException: 非法参数异常] with root cause java.lang.IllegalArgumentException: 非法参数异常 at com.tuling.tulingmall.controller.UmsCouponController.list\$original\$EjUHD41b(UmsCouponController.java:54) at com.tuling.tulingmall.controller.UmsCouponController.list\$original\$EjUHD41	f:\logs\tulingmall	\tulingmall-coupon.s.log

```

input {
  beats {
    port => 5044
    codec => "json"
  }
}

filter {
  grok {
    match => {
      "message" => "(?<time>\d{4}\-\d{2}\-\d{2})\s\d{2}:\d{2}:\d{2}\.\d{3}}\s(?<level>\w{4,5})\s+\T\I\|D\:\s*(?<trace_id>[0-9a-f]{53,54})\s%\{DATA:thread}\s%\{DATA:class}\:%\{GREEDYDATA:content}"
    }
  }
  mutate {
    remove_field => "message" # 删除原始日志内容节省存储和带宽
  }
}

output {
  elasticsearch {
    hosts => ["192.168.65.220:9200"]
    index => "tlmall-log" # ES 重建索引
  }
}

```

启动 Logstash

# 测试配置是否正确

bin/logstash -f config/tlmall-skywalking.conf --config.test\_and\_exit

#启动 Logstash

bin/logstash -f config/tlmall-skywalking.conf --config.reload.automatic

## 测试：在 kibana 中根据 trace\_id 搜索对应的系统日志

整合 Skywalking 和 ELK 后，通过 trace id，在 Skywaling 中快速看到链路中哪个环节出了问题，然后在 ELK 中按 trace id 搜索对应的系统日志，这样就可以很方便的定位出问题，

<http://192.168.65.25:5601/>

a8bc911cc2244eabd73aa9699f94dc155.1665294372488002 |
KQL
刷新

level: ERROR ×
+ 添加筛选

tulingmall-2022.10 ▾
2 个命中

	tid	level	thread	skyWalkingContext	class	message
<span>f</span> tid	TID:a8bc911cc2244eabd73aa9699f94dc155.1665294372488002	ERROR	http-nio-8877-exec-5	SW_CTX:[tulingmall-member_cda3ff94966844f3ca080845fbce90d87f80192_166.65.103.8886 9113cc2244eabd73aa9699f94dc155.1665294372488002],d1d873cd69a4bcd2e1d15f94fa45a.216.16652943724920000,0]	org.apache.catalina.core.ContainerBase.[Tomcat].[localhost].[/].dispatcherServlet:?	Servlet.service() for servlet [dispatcherServlet] in context with path [/] threw exception [Request processing failed; nested exception is feign.FeignException\$InternalServerErrorError: [500] during [GET] to [http://tulingmall-promotion/coupon/list] [CouponfeignService\$list(Integer,Long)]: [{"timestamp": "2022-10-08T05:46:12.539+08:00"}, {"status": "500", "error": "Internal Server Error", "message": ""}]]n
<span>f</span> level	TID:a8bc911cc2244eabd73aa9699f94dc155.1665294372488002	ERROR	http-nio-8877-exec-4	SW_CTX:[tulingmall-promotion_6726e1b14cde4ef4a4fc693b178d7440192_166.65.103.8886 9113cc2244eabd73aa9699f94dc155.1665294372488002],70a460942ea4b119bce4324c55d91b10.16652943724940000,0]	org.apache.catalina.core.ContainerBase.[Tomcat].[localhost].[/].dispatcherServlet:?	Servlet.service() for servlet [dispatcherServlet] in context with path [/] threw exception [Request processing failed; nested exception is java.lang.IllegalArgumentException: 非法参数异常] with root cause
<span>f</span> thread	TID:a8bc911cc2244eabd73aa9699f94dc155.1665294372488002	ERROR	http-nio-8877-exec-4	SW_CTX:[tulingmall-promotion_6726e1b14cde4ef4a4fc693b178d7440192_166.65.103.8886 9113cc2244eabd73aa9699f94dc155.1665294372488002],70a460942ea4b119bce4324c55d91b10.16652943724940000,0]	org.apache.catalina.core.ContainerBase.[Tomcat].[localhost].[/].dispatcherServlet:?	Servlet.service() for servlet [dispatcherServlet] in context with path [/] threw exception [Request processing failed; nested exception is java.lang.IllegalArgumentException: 非法参数异常] with root cause
<span>f</span> skyWalkingContext	TID:a8bc911cc2244eabd73aa9699f94dc155.1665294372488002	ERROR	http-nio-8877-exec-4	SW_CTX:[tulingmall-promotion_6726e1b14cde4ef4a4fc693b178d7440192_166.65.103.8886 9113cc2244eabd73aa9699f94dc155.1665294372488002],70a460942ea4b119bce4324c55d91b10.16652943724940000,0]	org.apache.catalina.core.ContainerBase.[Tomcat].[localhost].[/].dispatcherServlet:?	Servlet.service() for servlet [dispatcherServlet] in context with path [/] threw exception [Request processing failed; nested exception is java.lang.IllegalArgumentException: 非法参数异常] with root cause
<span>f</span> class	TID:a8bc911cc2244eabd73aa9699f94dc155.1665294372488002	ERROR	http-nio-8877-exec-4	SW_CTX:[tulingmall-promotion_6726e1b14cde4ef4a4fc693b178d7440192_166.65.103.8886 9113cc2244eabd73aa9699f94dc155.1665294372488002],70a460942ea4b119bce4324c55d91b10.16652943724940000,0]	org.apache.catalina.core.ContainerBase.[Tomcat].[localhost].[/].dispatcherServlet:?	Servlet.service() for servlet [dispatcherServlet] in context with path [/] threw exception [Request processing failed; nested exception is java.lang.IllegalArgumentException: 非法参数异常] with root cause
<span>f</span> message	TID:a8bc911cc2244eabd73aa9699f94dc155.1665294372488002	ERROR	http-nio-8877-exec-4	SW_CTX:[tulingmall-promotion_6726e1b14cde4ef4a4fc693b178d7440192_166.65.103.8886 9113cc2244eabd73aa9699f94dc155.1665294372488002],70a460942ea4b119bce4324c55d91b10.16652943724940000,0]	org.apache.catalina.core.ContainerBase.[Tomcat].[localhost].[/].dispatcherServlet:?	Servlet.service() for servlet [dispatcherServlet] in context with path [/] threw exception [Request processing failed; nested exception is java.lang.IllegalArgumentException: 非法参数异常] with root cause