Distributed tracing

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Agenda

- Spring Cloud Sleuth

- Log enhancement and correlation with Slf4J/Logback/Graylog

- Request visualization and latency analysis with Zipkin

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Spring Cloud Sleuth

- Distributed tracing tool for Spring Boot applications
- Builds on top of OpenZipkin Brave tracing library
- "sleuth": "a person who investigates crimes; a detective"
- Debugging request flow through multiple microservices
  - Where did an error occur?
    - Adds trace and span IDs to the logging context through MDC (Slf4J, Logback, Log4j)
  - Where was time spent?
    - Records timing information to aid in latency analysis and sends it to Zipkin
- Instruments common ingress and egress points (RPC, HTTP, messaging)

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Terminology

- **Span**: Basic unit of work that represents an operation; has events and tags; is started and stopped
- **Trace**: Set of spans that form a tree-like structure, one per request
- **Annotation/Event**:
  - (cs) client sent/start - Client made a request; start of a span
  - (sr) server received/start - Server got a request and started processing
  - (ss) server sent/finish - Server completed request processing
  - (cr) client received/finish - Client received response; end of a span
- **Baggage**: Additional fields to propagate across services within the tracing context
- **Tag**: Key-value pair that stores information corresponding to a span
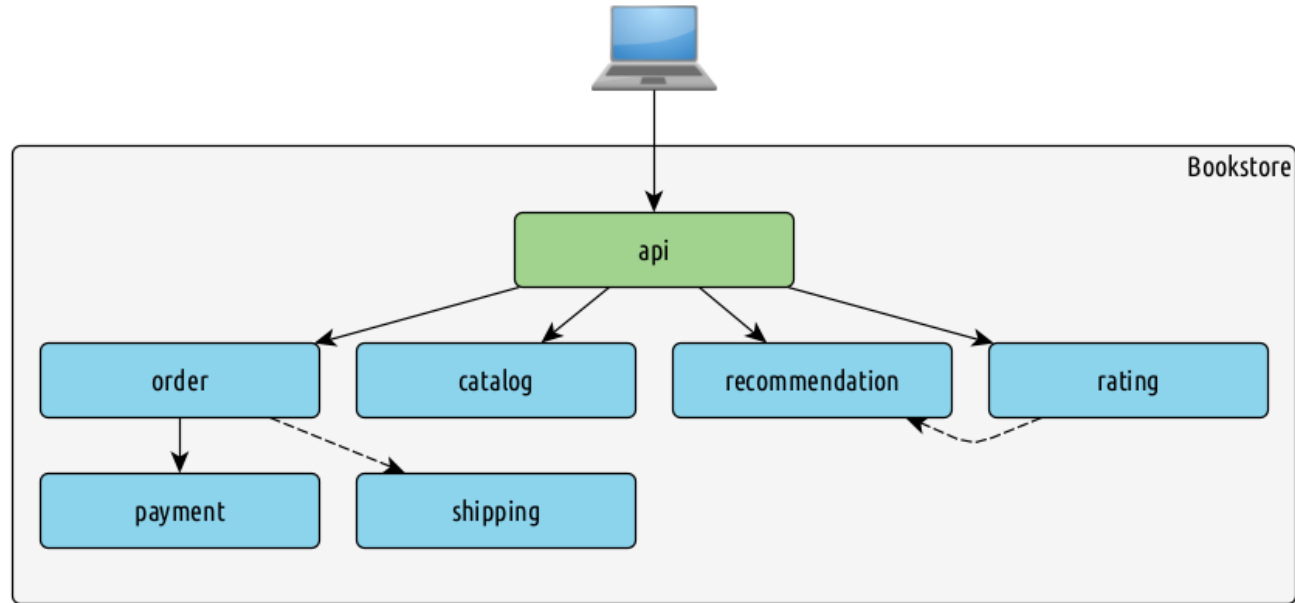
Example: Trace with multiple spans

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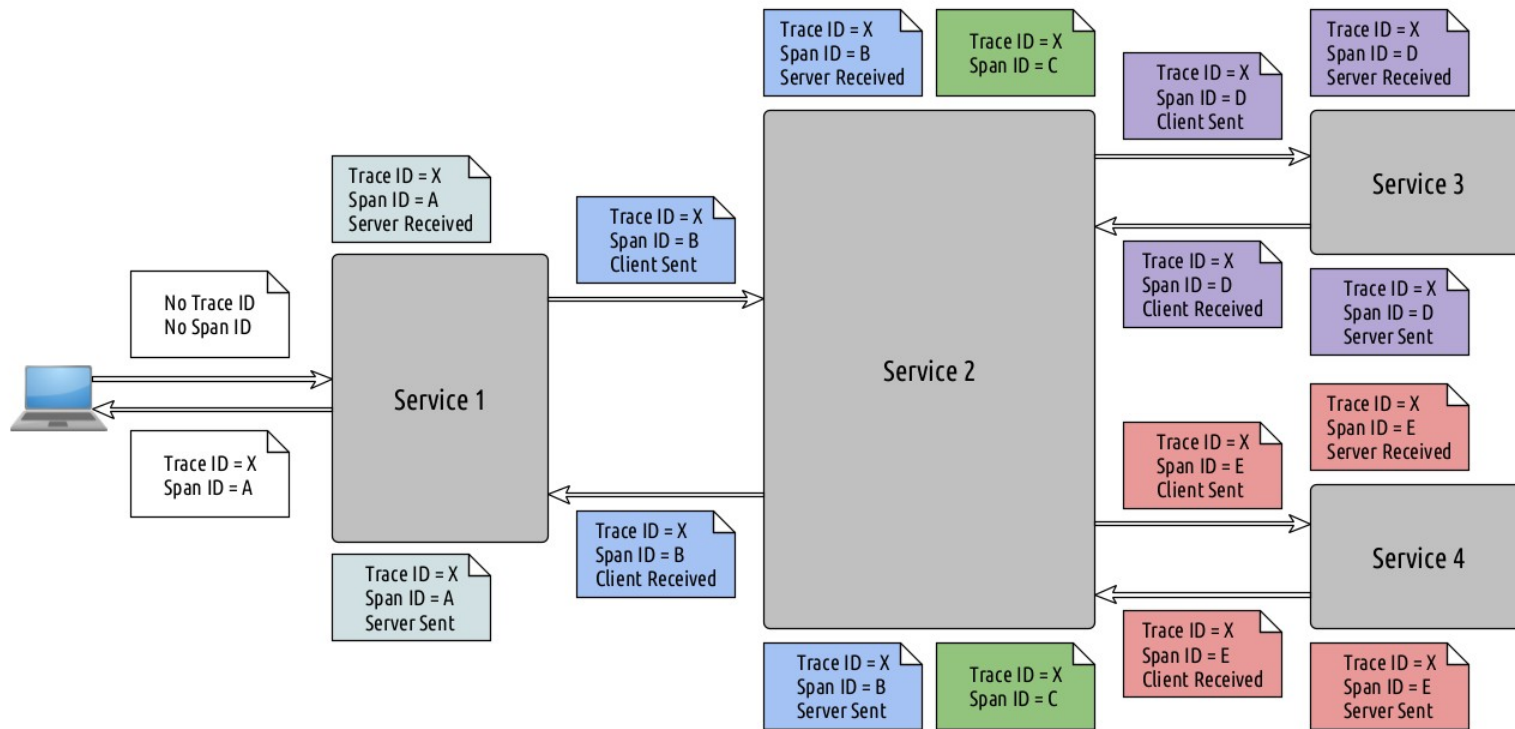
Example: Parent-child relationship of spans
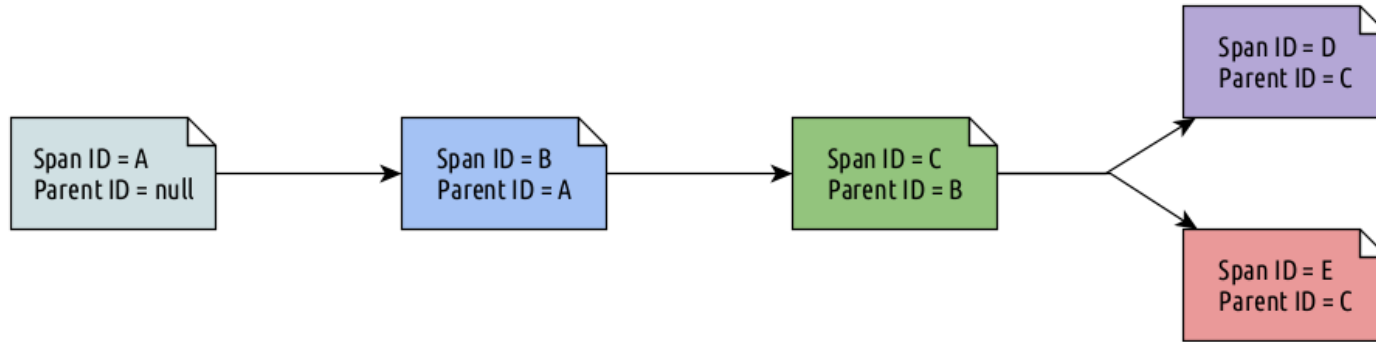
Demo: Getting started with Spring Cloud Sleuth

Demo: Bookstore

However

- Zipkin is not a logging tool - not all requests get sent to Zipkin
  - spring.sleuth.sampler.probability=0.5
- Don't create too much baggage

Distributed tracing landscape

Open Source

- OpenZipkin
- OpenTracing
- OpenCensus
- OpenTelemetry
- Jaeger

Enterprise

- Amazon X-Ray
- Datadog
- Dynatrace
- Google Cloud Trace
- Honeycomb
- Instana
- Lightstep
- New Relic
- Wavefront

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References

- https://spring.io/projects/spring-cloud-sleuth

- https://zipkin.io

- https://www.graylog.org

- https://github.com/nikola-zivkov/2021-12-01-distributed-tracing-talk

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Q&A

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Thanks!

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