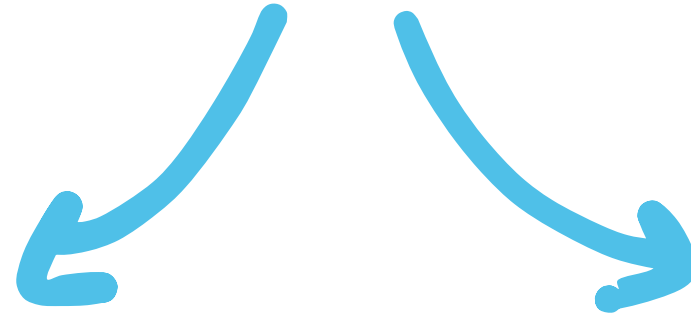




Distributed Tracing with Go

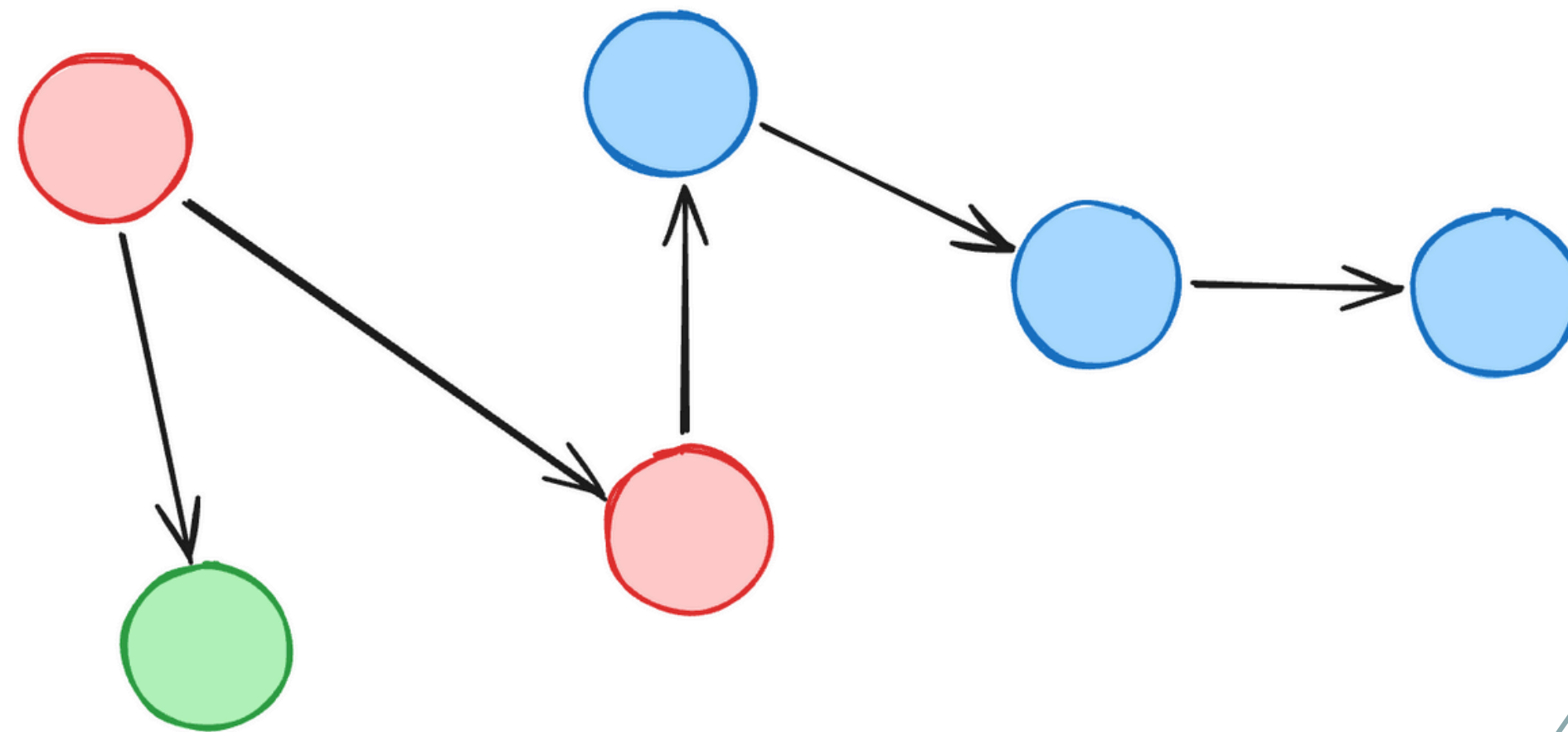
Ayşe Sert

About me



trendyol.com

What is distributed system?

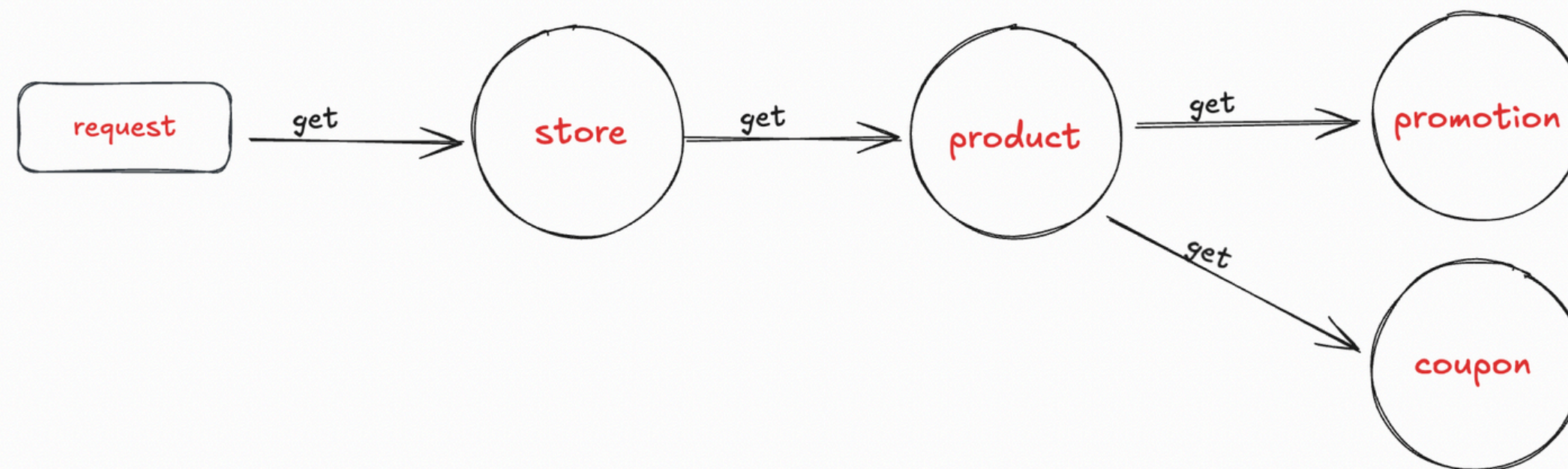


What happens when it is distributed?

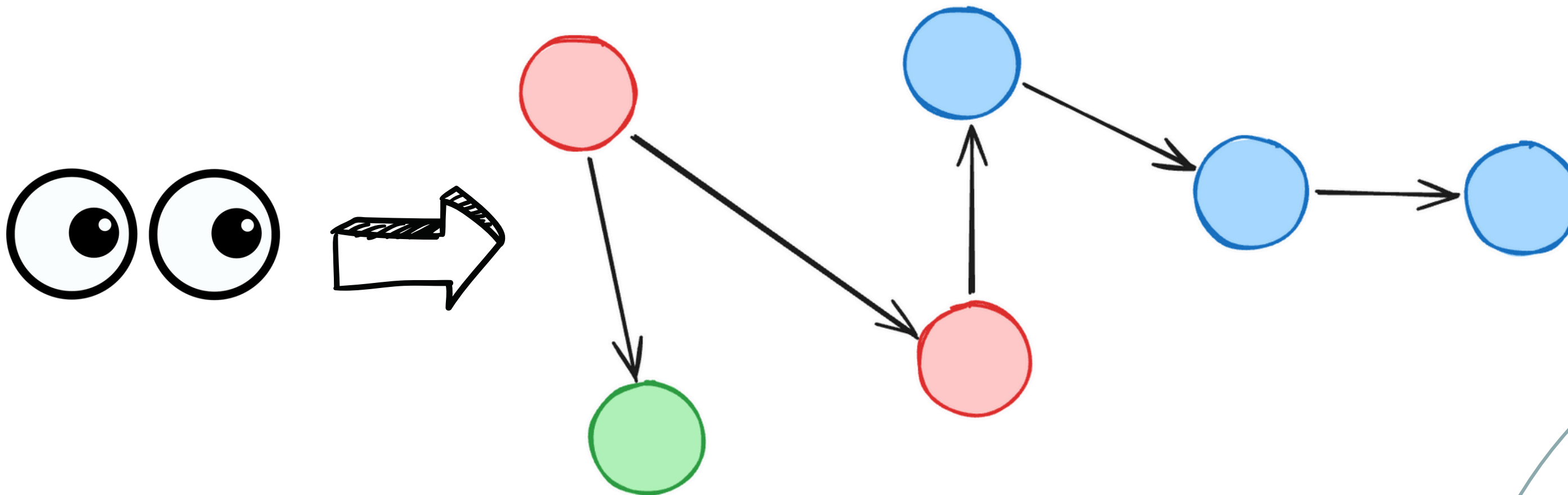
Consider a user looking at stores to buy a product from an **online shopping application**.

The user enters the store where wants to shop and lists the products.

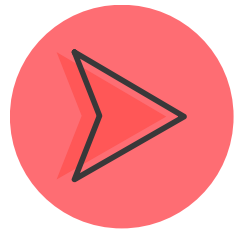
A request is created that goes to:



What is tracing?

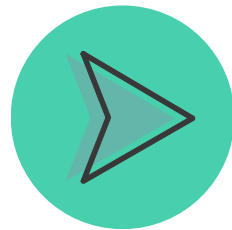


The Different Types of Tracing



CODE TRACING

Code tracing is a software process that inspects the flow of source codes in an application when performing a specific function



PROGRAM TRACING

Program tracing is a method wherein developers can examine the addresses of instructions and variables called by an active application.



END-TO-END TRACING

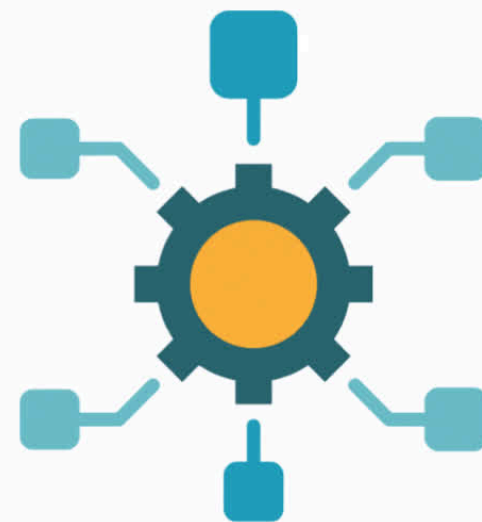
With end-to-end tracing development teams can track data transformation along the service request path.

What are the key components of Distributed Tracing?

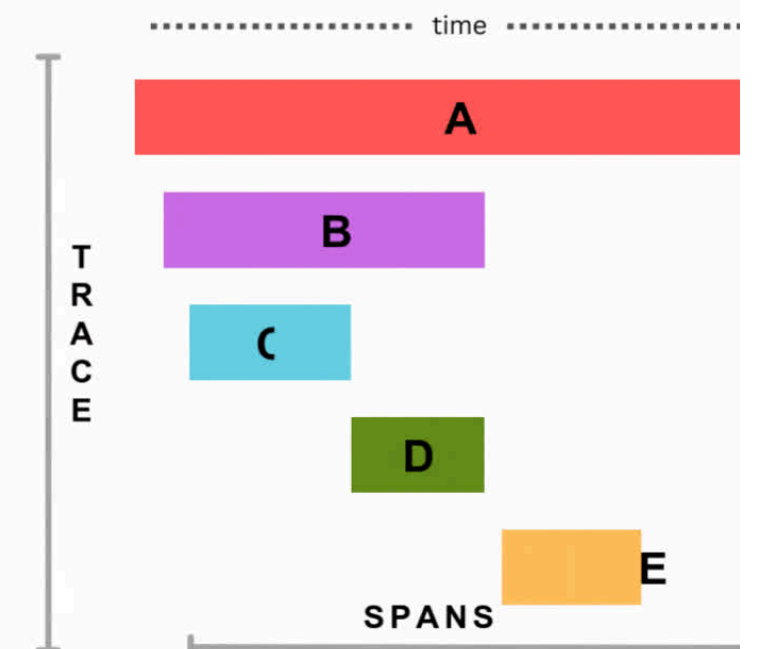
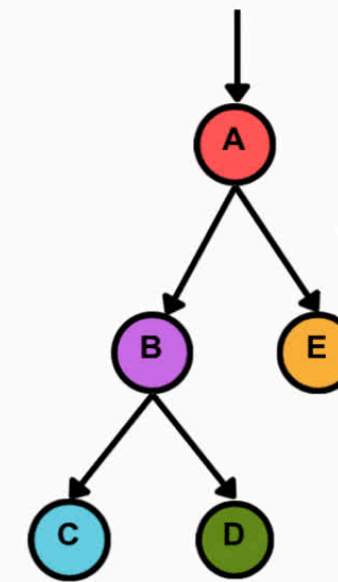
SPAN

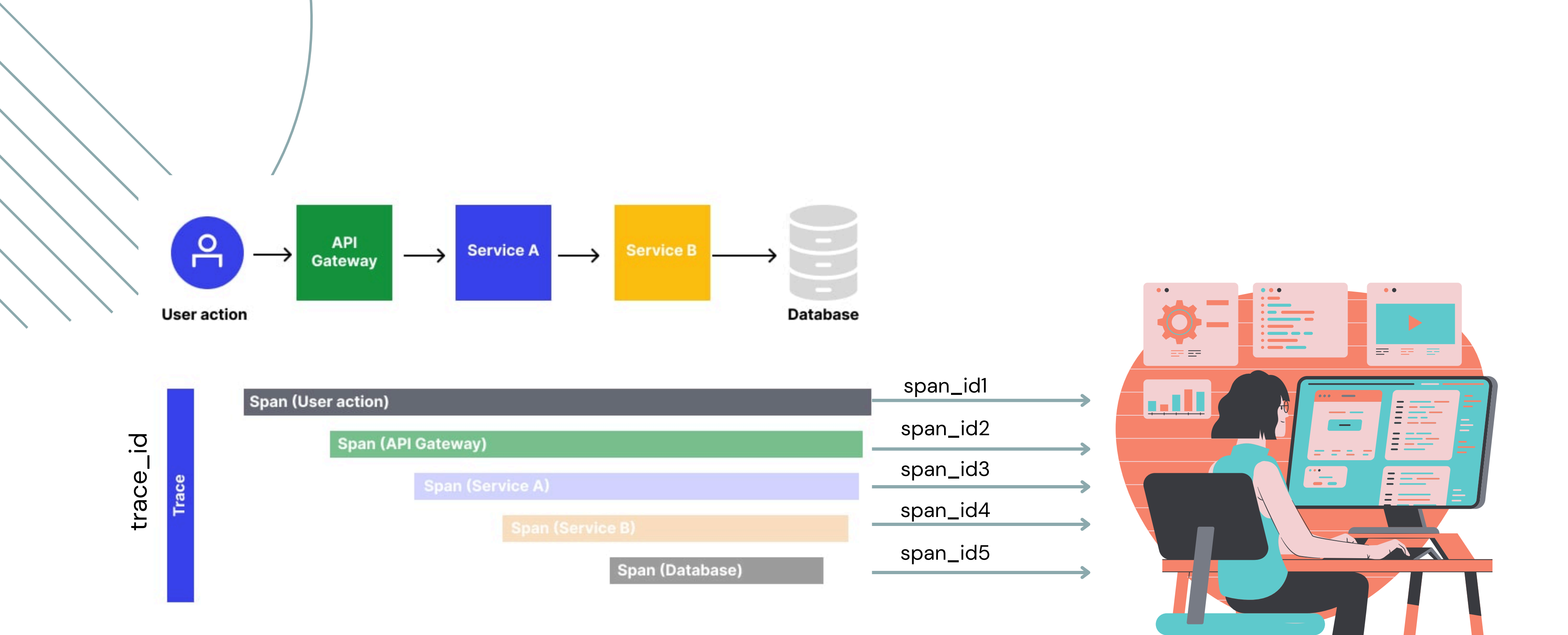
TRACE ID

METRIC COLLECTION

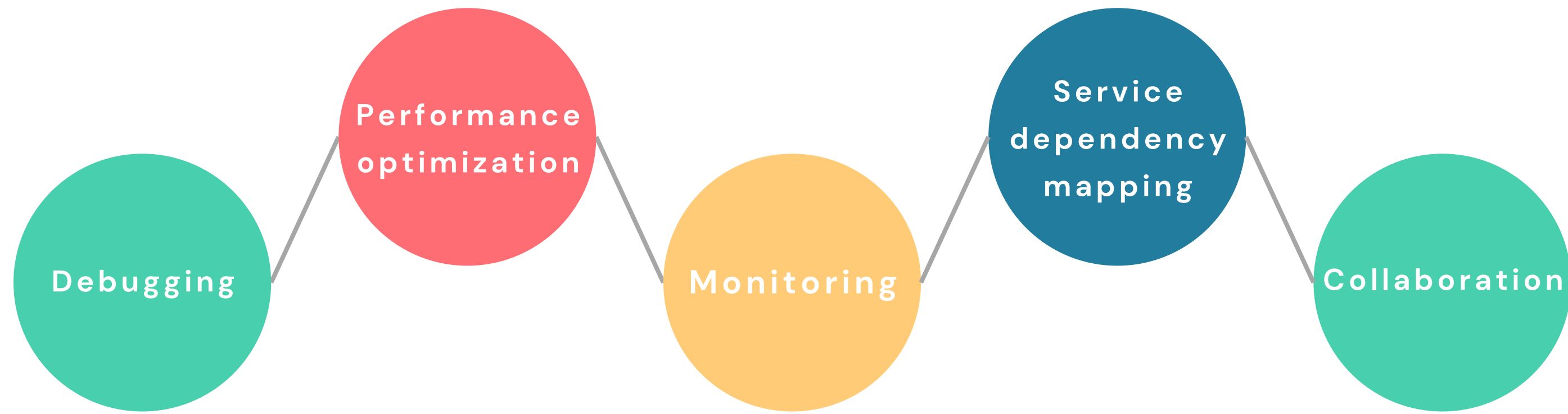


microservices





Benefits of Distributed Tracing

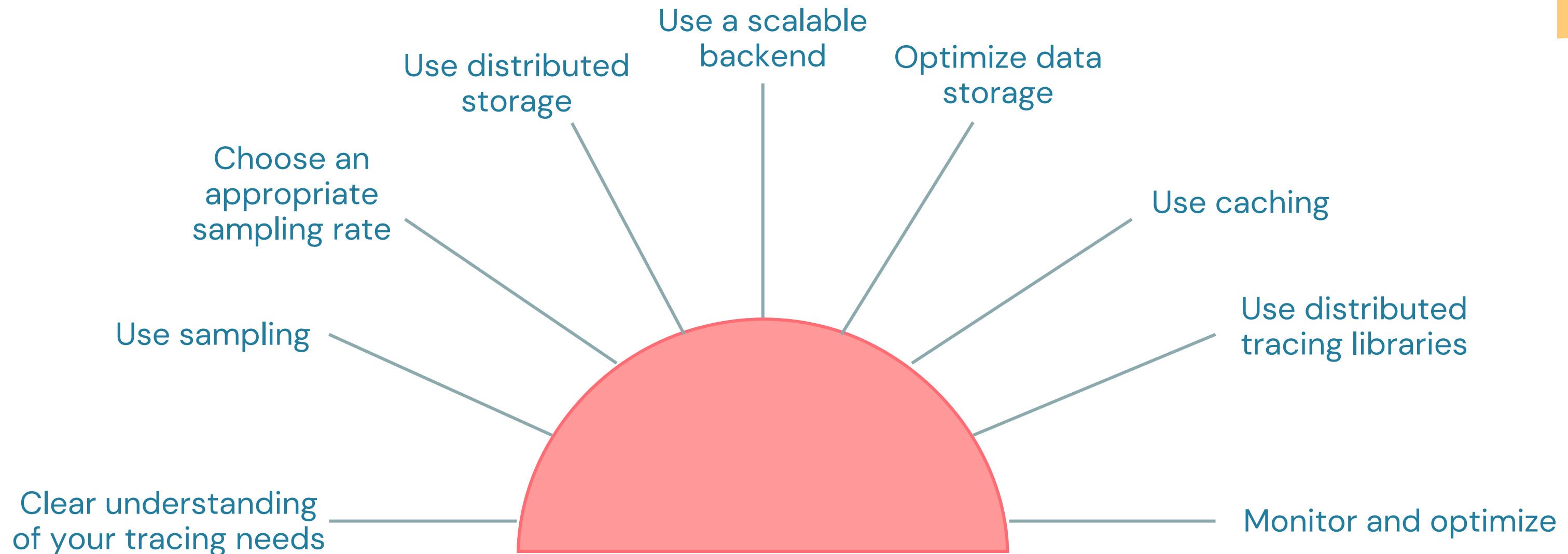




Logging and Distributed Tracing

	Logging	Tracing
Purpose	Recording Events, Messages, and Data Generated	Monitor and Trace Requests
Key Characteristics	<ul style="list-style-type: none">• Event Recording• Structured and Unstructured Data• Flexibility• Storage and Retention• Alerting and Monitoring	<ul style="list-style-type: none">• End-to-End Visibility• Contextual Information• Performance Profiling• Root Cause Analysis• Complex Environments
Use Cases	<ul style="list-style-type: none">• Debugging• Security and Compliance• Auditing• Historical Analysis	<ul style="list-style-type: none">• Performance Optimization• Debugging• Understanding Request Flow

Best Practices for Distributed Tracing



Distributed Tracing Tools



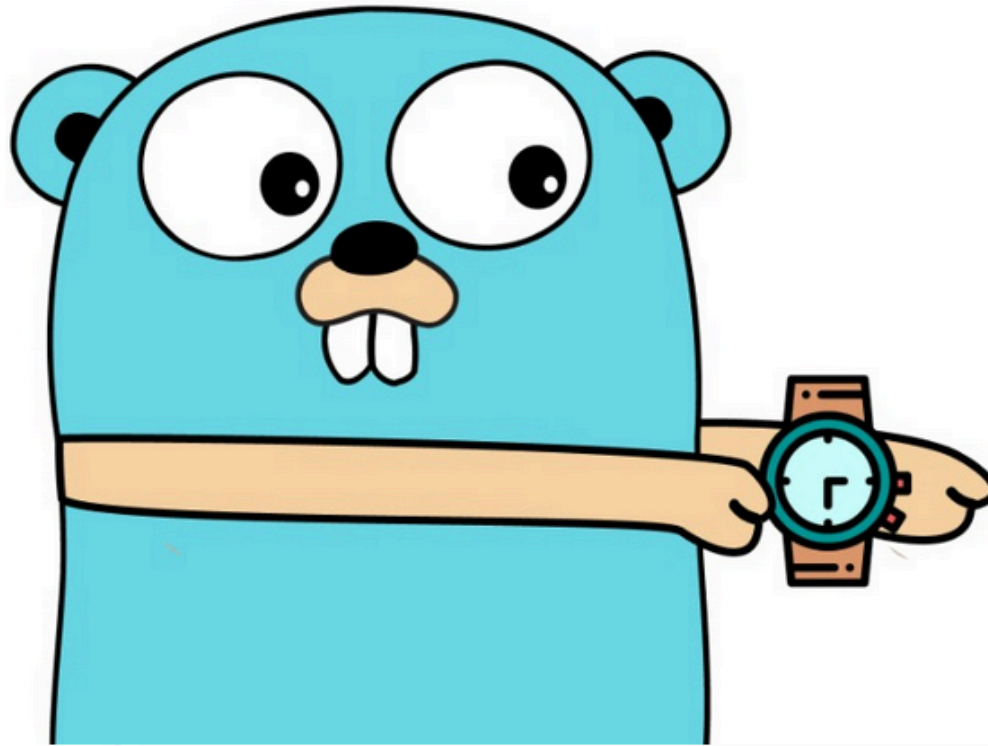
Open-Sources Tools

Tools	Description	Key Feature
	<ul style="list-style-type: none">- Developed by Uber- end-to-end distributed tracing tool for monitoring and troubleshooting <u>microservices</u>	<ul style="list-style-type: none">- Distributed context propagation- Root cause analysis.- Performance optimization.- Backend support for <u>Elasticsearch</u>, Kafka, and Cassandra.
	<ul style="list-style-type: none">- Developed at Twitter- for gathering timing data	<ul style="list-style-type: none">- Low latency and lightweight- Support for various storage backends (MySQL, <u>Elasticsearch</u>)- Integration with Spring Cloud Sleuth and other Java frameworks.
	<ul style="list-style-type: none">- A CNCF project that provides APIs, libraries, and tools for telemetry (traces, metrics, and logs).	<ul style="list-style-type: none">- Unified instrumentation standard for traces, metrics, and logs- Rich language support (Java, Python, Go, etc.)-Vendor-neutral and supports multiple exporters.
	<ul style="list-style-type: none">- An open-source alternative to tools like DataDog and New Relic- Focused on application performance monitoring (APM) and distributed tracing	<ul style="list-style-type: none">- Native OpenTelemetry support- Built-in visualizations for traces and metrics- Supports ClickHouse as a backend.
	<ul style="list-style-type: none">- Developed by Expedia- end-to-end distributed tracing	<ul style="list-style-type: none">- Real-time dependency graph visualization- High availability and fault tolerance- Root cause identification.

Enterprise Tools

Tools	Description	Key Feature
 DATADOG	A commercial application performance monitoring tool with distributed tracing capabilities.	<ul style="list-style-type: none">- Automatic instrumentation for various programming languages- Advanced analytics for performance bottlenecks- Integration with infrastructure monitoring and logging.
 new relic	Part of New Relic's full-stack observability suite	<ul style="list-style-type: none">- AI-powered root cause analysis- Integration with metrics, logs, and error tracking- Easy-to-use visualization tools.
 APPDYNAMICS	<ul style="list-style-type: none">- Cisco's application performance management solution, which includes distributed tracing features	<ul style="list-style-type: none">- Automatic application topology mapping- AI-driven anomaly detection- Integration with infrastructure and business performance monitoring.
 aws X-Ray	Amazon's distributed tracing service designed for AWS services	<ul style="list-style-type: none">- Seamless integration with AWS ecosystem (e.g., Lambda, ECS)- Tracing for microservices architectures- Advanced visualizations for request flows.
 splunk >	Combines application performance monitoring, logs, and metrics into one solution with distributed tracing capabilities.	<ul style="list-style-type: none">AI/ML-driven insights- Real-time troubleshooting with full-fidelity traces- High scalability for enterprise systems.
 dynatrace	An all-in-one APM solution that uses AI for distributed tracing and problem analysis.	<ul style="list-style-type: none">- Automatic dependency detection- Support for hybrid and multi-cloud environments- Advanced analytics and root cause determination.

It's Go Time



Distributed Tracing Cons

- Complexity in Implementation
- Performance Overhead
- Storage and Data Management Costs
- Tooling Dependencies
- Learning Curve
- Data Noise and Overhead
- Context Propagation Issues
- Privacy and Security Risks
- Lack of Standardization in Tooling



THANK YOU

 [ayse-sert](#)