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DESIGN STUDY

One trace from login to match for a live-service game: OpenTelemetry on GKE and Agones, Splunk as the backend

Complete design on current platforms

CAPABILITY	INDUSTRY	SETTING
Digital	Media & Gaming	Live-service game studio
DOCUMENT	**VERSION**	**DATE**
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Document control

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Sign-off	"An engagement under this design is signed by the practice lead before any build proceeds."		

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CONVENTIONS

Source tags. [S] figure read from the project's or vendor's own current page on Sep 24, 2026 · [S*] figure from the owner's page summary where the page itself could not be opened · [A] design assumption · [T] design target (the record's outcome figure and anything derived from it). Every figure carries one tag. No figure comes from any prior engagement, file or asset. A row with more than one tag is counted once: as a published figure if any tag is [S] or [S*], otherwise as an assumption if any tag is [A], otherwise as a design target.

Table 1. Revision history

Date	Version	Change
Sep 27, 2026	`1.0`	First issue.
Oct 10, 2026	`1.1`	Approval line now reads: approved by the Founder, issued by Symbeeo. Avinash Dhinakaran remains the author.

1 · Scope

Who it is for. The head of live operations or the platform engineering lead of a game studio running an online multiplayer title, whose backend teams each chose their own monitoring agent, and who cannot follow one player from sign-in to a match when a launch-day queue stalls.

Typical buyer [A]. A studio with one live-service title: 40 backend services (login, entitlements, matchmaking, party, store, telemetry ingest), dedicated game servers allocated by Agones, on Google Kubernetes Engine (GKE) in 3 regions. Peak 250,000 concurrent players; a new season launch runs at 4 × a normal evening for 48 h [A].

What is in. One telemetry pipeline for traces, metrics and logs over OTLP; trace propagation across every backend hop; sampling; SLOs and burn-rate paging for login and matchmaking; cluster and Agones release pins; the backend. **What is out.** Game-client crash reporting; anti-cheat; the game servers' own network code; the player-facing status page.

Assumptions. Backend services are in languages with OpenTelemetry SDKs [A]. The studio already holds a Splunk Observability Cloud subscription for one team and a Splunk Cloud Platform index for logs [A]. Game servers are UDP; traces cover match lifecycle, not packets [A].

Related documents, read Sep 24, 2026. SRA-DIG-001, SDD-DIG-001, STP-DIG-001 v1.0 (issued Sep 27, 2026) · Agones installation and Kubernetes version support (`https://agones.dev/site/docs/installation/`) · Agones v1.61.0 release (`https://github.com/agones-dev/agones/releases/tag/v1.61.0`) · GKE release schedule (`https://docs.cloud.google.com/kubernetes-engine/docs/release-schedule`) · Kubernetes releases (`https://kubernetes.io/releases/`) · OpenTelemetry semantic conventions (`https://opentelemetry.io/docs/specs/semconv/`) · OpenTelemetry Collector releases (`https://github.com/open-telemetry/opentelemetry-collector-releases/releases`) · Splunk Distribution of the OpenTelemetry Collector releases (`https://github.com/signalfx/splunk-otel-collector/releases`) · Splunk Observability Cloud, OTLP/HTTP exporter (`https://help.splunk.com/en/splunk-observability-cloud/manage-data/splunk-distribution-of-the-opentelemetry-collector/get-started-with-the-splunk-distribution-of-the-opentelemetry-collector/collector-components/exporters/otlphttp-exporter`) · OpenTelemetry eBPF Instrumentation releases (`https://github.com/open-telemetry/opentelemetry-ebpf-instrumentation/releases`).

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1c · Public implementations this design follows

Each row is labeled. **Public deployment**: a named operator's real deployment, published and dated by the operator, its vendor or a partner, used where one exists. **Our own design**: the dated vendor or standards documentation this design was built from, where no public deployment of the design exists. Labels and dates checked Sep 27, 2026.

Table 2. Public implementations this design follows

Implementation	Who published it · date	What it settles for this design	URL
Our own design, built from published documentation. Agones Kubernetes version support	Agones project · v1.61.0 released Sep 24, 2026	Agones 1.60 and 1.61 support Kubernetes 1.34, 1.35 and 1.36; the newest version tracks the GKE Rapid channel. The cluster pin in R2 and R3 is the overlap of this list with upstream support	`https://agones.dev/site/docs/installation/`
Our own design, built from published documentation. GKE release schedule	Google Cloud · page last updated Sep 24, 2026	1.36 in the Regular channel since Jun 9, 2026, end of standard support Aug 9, 2027; 1.37 reaches Regular about Sep 30, 2026	`https://docs.cloud.google.com/kubernetes-engine/docs/release-schedule`
Our own design, built from published documentation. Splunk Observability Cloud OTLP/HTTP exporter	Splunk · page last updated May 3, 2026; read Sep 24, 2026	"Use the OTLP/HTTP exporter as the default method to send traces"; metrics to the OTLP datapoint endpoint; the backend takes OTLP as sent, so no proprietary agent is needed	`https://help.splunk.com/en/splunk-observability-cloud/manage-data/splunk-distribution-of-the-opentelemetry-collector/get-started-with-the-splunk-distribution-of-the-opentelemetry-collector/collector-components/exporters/otlphttp-exporter`

No public, dated deployment of Agones on GKE with OpenTelemetry at a named studio was found on Sep 27, 2026; every row is documentation used to build our own design.

2 · Requirements register

Table 3. Requirements register

#	Requirement	Value	Source
R1	Estate	40 services · 3 regions · 250,000 peak concurrent players	[A]
R2	Cluster release	GKE 1.36, Regular channel; upstream support to Jun 28, 2027, GKE standard support to Aug 9, 2027	[S] Kubernetes; [S] Google
R3	Game-server orchestration	Agones 1.61, supported on Kubernetes 1.34–1.36; no cluster moves to 1.37 until Agones supports it	[S] Agones
R4	Services emitting traces, metrics and logs over OTLP	40 of 40	[S] SRA-DIG-001 R10

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#	Requirement	Value	Source
R5	One trace per player session	login → entitlements → matchmaking → allocation → match start	[S] SRA-DIG-001 R11
R6	Semantic conventions	pinned to 1.44.0	[S] OpenTelemetry
R7	Telemetry records dropped at launch-day load	≤ 0.1 %, counted	[T]
R8	Login SLO	≥ 99.9 % successful sign-ins per 28 days	[T]
R9	Matchmaking SLO	≤ 30 s p95 from queue to match found	[T]
R10	Page on SLO burn	≤ 5 min after the burn-rate threshold	[T]
R11	Trace sampling	100 % of error and slow traces; 5 % of the rest	[T]
R12	Retention	metrics 13 months · traces 14 days · logs 12 months	[T] SRA-DIG-001 R18

Twelve rows; five carry a project's, vendor's or standard's figure, one is a design assumption, six are design targets.

3 · Architecture overview

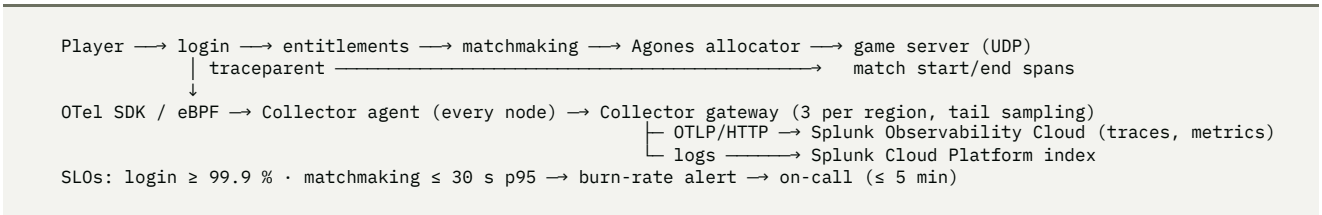


Figure 1. Game telemetry pipeline

Every service speaks OTLP to a Collector; only the gateway knows the backend, so the backend is replaceable without touching a service.

Table 4. Architecture overview

Role	Component (exact name)	Qty	Capacity used	Why this unit
Cluster	Google Kubernetes Engine 1.36, Regular channel	3 regional clusters	40 services + game-server fleets	inside Agones and upstream support [S]
Game servers	Agones 1.61.0	1 per cluster	fleets sized per region [A]	released Sep 24, 2026; Kubernetes 1.34–1.36 [S]
Node agent	Splunk Distribution of the OpenTelemetry Collector v0.161.0	1 per node	—	released Sep 18, 2026 [S]; upstream Collector v0.161.0 of Sep 16, 2026 is the fallback [S]
Gateway	same Collector, gateway mode, tail sampling	3 per region	launch-day load [A]	SRA-DIG-001 §4.7 [S]

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Role	Component (exact name)	Qty	Capacity used	Why this unit
Traces and metrics backend	Splunk Observability Cloud	1 organization	—	OTLP/HTTP ingest [S]
Coverage for uninstrumented services	OpenTelemetry eBPF Instrumentation v0.13.0	per node where needed	—	pre-1.0, released Sep 4, 2026 [S]; coverage only

4 · Design by subsystem

4.1 Cluster and Agones pins.

GKE 1.36 on the Regular channel [S]. Agones 1.61 supports 1.34 to 1.36 [S], so the channel's move to 1.37 (about Sep 30, 2026 in Regular [S]) is held by a maintenance exclusion until an Agones release lists 1.37 (R3) [A]. Rejected: Rapid channel — it would offer 1.37 before Agones supports it [S].

4.2 Instrumentation.

Each backend service uses the OpenTelemetry SDK for its language, exporting OTLP to the node agent (R4) [S]. Semantic conventions pinned to 1.44.0 (R6) [S]. Two legacy services the studio cannot rebuild before the season launch get eBPF instrumentation, marked as coverage, not as evidence for any SLO [A].

4.3 Propagation.

`traceparent` travels in HTTP and gRPC headers from login to matchmaking, and matchmaking passes it on the allocation request (R5) [A]. The game server emits one span for match start and one for match end, linked to the player's trace [A]. Whether the Agones allocator carries the header through was not read (§6).

4.4 Sampling and volume.

Gateway tail sampling keeps every error or slow trace and 5 % of the rest (R11) [T]. Drop counters on agents and gateways are metrics, alerted at 0.1 % (R7) [T]. Launch-day sizing: gateways scaled from a load test at 4 × a normal evening [A].

4.5 Backend.

Traces and metrics leave the gateway over OTLP/HTTP to Splunk Observability Cloud, the vendor's stated default for traces [S]; logs go to the studio's Splunk Cloud Platform index [A]. Rejected: each team's own proprietary agent — fails R4 and ties each team to one backend. Because the gateway speaks OTLP, a later change of backend is one exporter block, not 40 service changes [A].

4.6 SLOs and paging.

Login ≥ 99.9 % over 28 days (R8) and matchmaking ≤ 30 s p95 (R9) [T], each with multi-window burn-rate alerts paging on-call within 5 minutes of the threshold (R10) [T]. **Where they are evaluated:** in Splunk Observability Cloud, whose SLO feature evaluates burn-rate alerts itself, with short windows one-twelfth of the long ones, on custom-metric SLIs built from good and total counters [S] (`https://help.splunk.com/en/splunk-observability-cloud/create-alerts-detectors-and-service-level-objectives/create-service-level-objectives-slos/burn-rate-alerts`, last updated Jul 16, 2025, read Sep 27, 2026). Nothing is evaluated in the clusters, so the SLIs are sent as counters over the same OTLP path [A]. Region is a dimension on both, so one region's queue stall pages as that region [A]. A no-data detector on the gateways' own export metrics pages on-call when telemetry stops arriving, because burn-rate alerts cannot fire on missing data [A].

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5 · Failure behavior

Table 5. Failure behavior

Failure	Behavior	Source
One Collector gateway replica down	agents retry to the other replicas; drops counted	[A] SRA-DIG-001 F7
Backend unreachable	gateway queues to its disk limit, then drops and counts; burn-rate alerts cannot evaluate, so the no-data detector pages on-call; queued data is sent on restore and the SLOs resume	[A]
Telemetry surge at season launch	gateway scales out; sampling holds errors at 100 %; drops above 0.1 % alert	[T]
Trace breaks at the allocator	match spans still recorded, linked by match ID instead of trace ID; gap reported	[A]
GKE offers 1.37 before Agones supports it	maintenance exclusion holds 1.36; reviewed each Agones release	[A]

6 · Limits

- Whether the Agones allocator forwards `traceparent` on allocation was not read; §4.3 and §5 carry a match-ID link as the fallback.
- eBPF instrumentation is pre-1.0 (v0.13.0) and is used for coverage only.
- Kubernetes 1.36 leaves upstream support on Jun 28, 2027 [S]; the move to 1.37 depends on an Agones release that lists it.
- Log ingest to Splunk Cloud Platform is an assumption about the studio's existing index; the exporter for it was not read.
- No figure here has been measured; every rate, SLO and volume is an assumption or a target.

7 · Lessons learned

None yet — this is a design study; populated after the first build against it.

8 · The author

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Signed off by Edwin Ozer, Founder.

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SYMBEEO

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Figures are as published by their sources on the dates given in this document; figures marked [A] are assumptions.

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