



Netflix's Viewing Data Microservices

**How We Know Where You Are in
House of Cards**

@zimmermatt

NETFLIX



HOUSE  of CARDS

1m  49m



Netflix Scale

Netflix Scale

62,000,000

Netflix Scale

62,000,000

50+

Netflix Scale

62,000,000

50+

3,000,000,000+

Netflix Scale

62,000,000

50+

3,000,000,000+

1000+

Netflix Scale

62,000,000

50+

3,000,000,000+

1000+

37%

Viewing Data

Viewing Data: History

Who



Viewing Data: History

Who, What



Viewing Data: History

Who,

What,

When



6/10/2015 11:55

Viewing Data: History

Who,

What,

When,

Where



6/10/2015 11:55



Viewing Data: History

Who,



What,



When,

6/10/2015 11:55

Where,



How Long

Duration

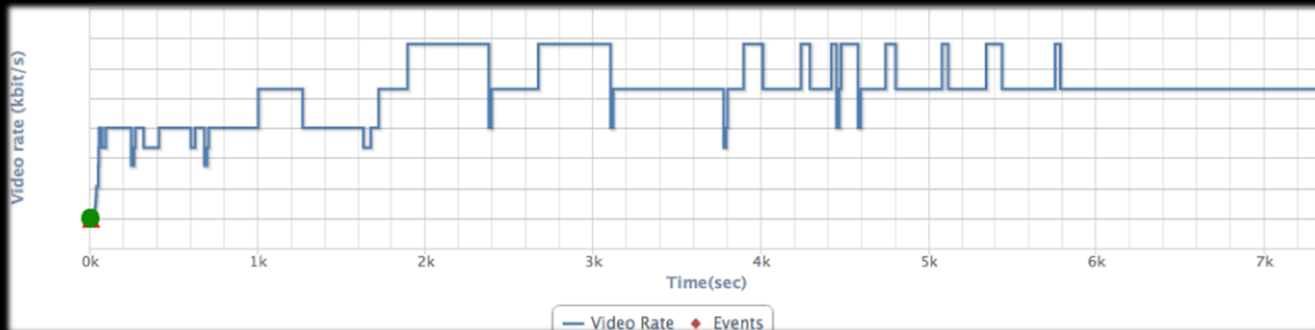
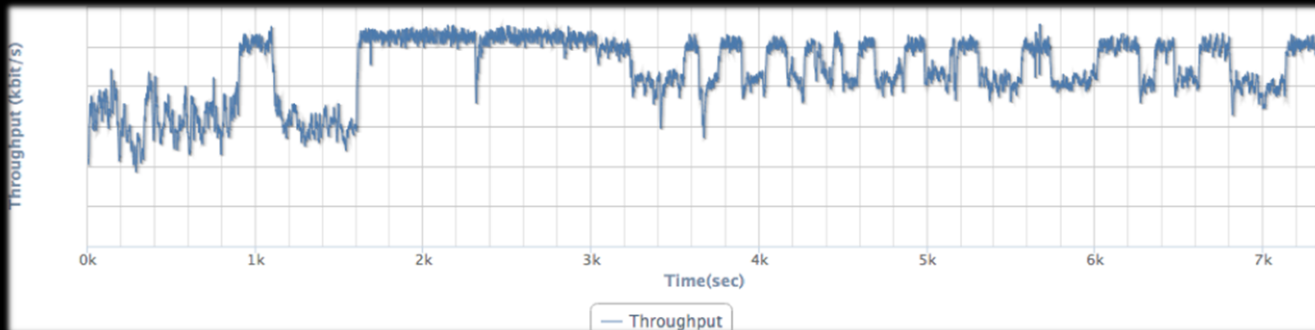
0:15:11

Latest
Position

14:41



Viewing Data: Telemetry



What have I watched?

Continue Watching for Matt



My Activity Watching Rating

[See recent account access](#)

5/13/15	Chef's Table: Season 1: "Massimo Bottura"	Report a problem ✕
4/28/15	Bloodline: Season 1: "Part 13"	Report a problem ✕
4/28/15	Bloodline: Season 1: "Part 12"	Report a problem ✕
4/27/15	Bloodline: Season 1: "Part 11"	Report a problem ✕
4/27/15	Bloodline: Season 1: "Part 10"	Report a problem ✕
4/26/15	Bloodline: Season 1: "Part 9"	Report a problem ✕
4/26/15	Bloodline: Season 1: "Part 8"	Report a problem ✕
4/25/15	Bloodline: Season 1: "Part 7"	Report a problem ✕
4/25/15	Bloodline: Season 1: "Part 6"	Report a problem ✕

What have I watched?

Continue Watching for Matt



My Activity Watching Rating

[See recent account access](#)

5/13/15	Chef's Table: Season 1: "Massimo Bottura"	Report a problem <input type="checkbox"/>
4/28/15	Bloodline: Season 1: "Part 13"	Report a problem <input checked="" type="checkbox"/>
4/28/15	Bloodline: Season 1: "Part 12"	Report a problem <input type="checkbox"/>
4/27/15	Bloodline: Season 1: "Part 11"	Report a problem <input type="checkbox"/>
4/27/15	Bloodline: Season 1: "Part 10"	Report a problem <input type="checkbox"/>
4/26/15	Bloodline: Season 1: "Part 9"	Report a problem <input type="checkbox"/>
4/26/15	Bloodline: Season 1: "Part 8"	Report a problem <input type="checkbox"/>
4/25/15	Bloodline: Season 1: "Part 7"	Report a problem <input type="checkbox"/>
4/25/15	Bloodline: Season 1: "Part 6"	Report a problem <input type="checkbox"/>

Where was I at?



Chapter 34

43m

A hurricane endangers more than just the entire East Coast and Frank must make a difficult choice.

4m  49m

What else am I watching?

Too many people are using your account right now.

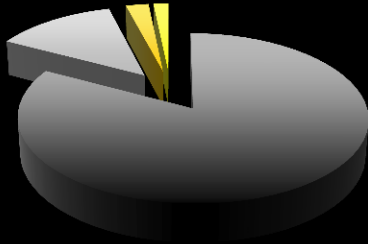
To watch House of Cards, stop playing on this screen:

iPhone - Orange Is the New Black (Doppelganger)

Retry

What Happened?

Video Bitrate Usage



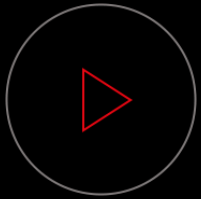
Whoops, something went wrong...

Internet Connection Problem

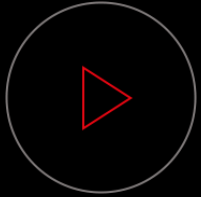
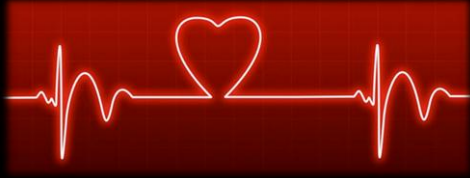
An Internet or home network connection problem is preventing playback. Please check your Internet connection and try again.



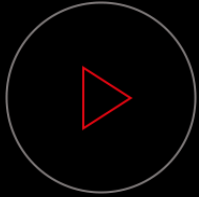
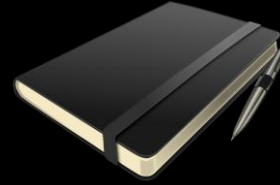
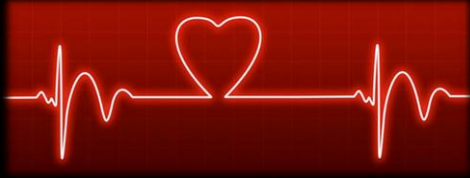
Viewing Data Requests



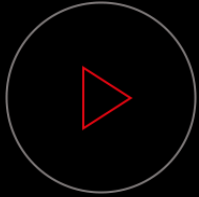
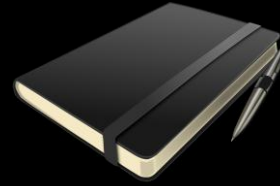
Viewing Data Requests



Viewing Data Requests



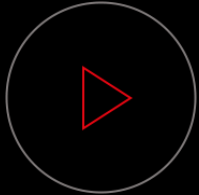
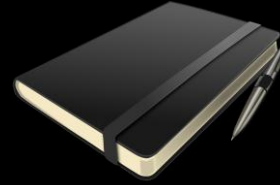
Viewing Data Requests



Continue Watching for Matt




Viewing Data Requests



Continue Watching for Matt



14m  49m

**TOUCHING WIRES CAUSES
INSTANT DEATH**

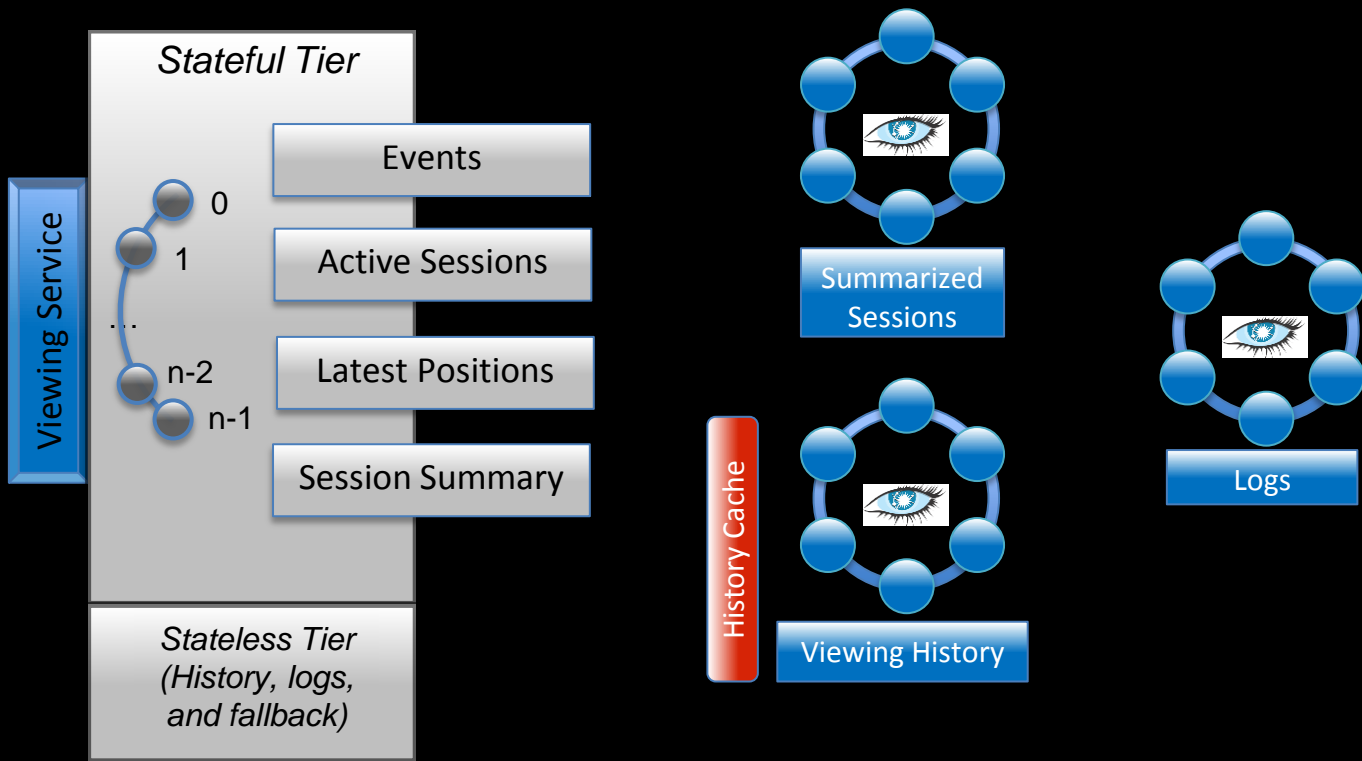


\$200 FINE

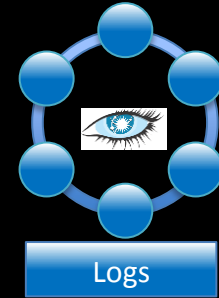


• Newcastle Tramway Authority •

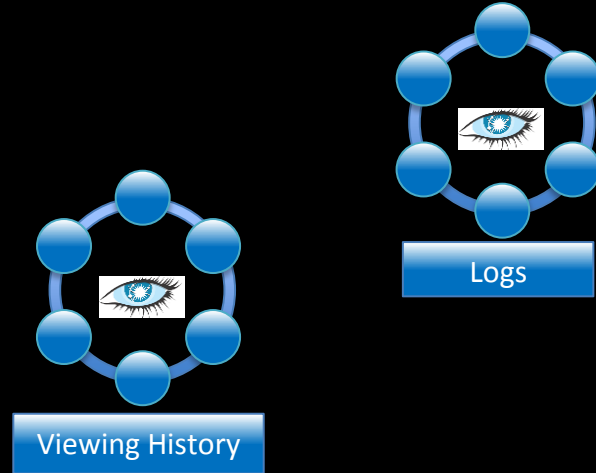
Gen 3 (Existing) System



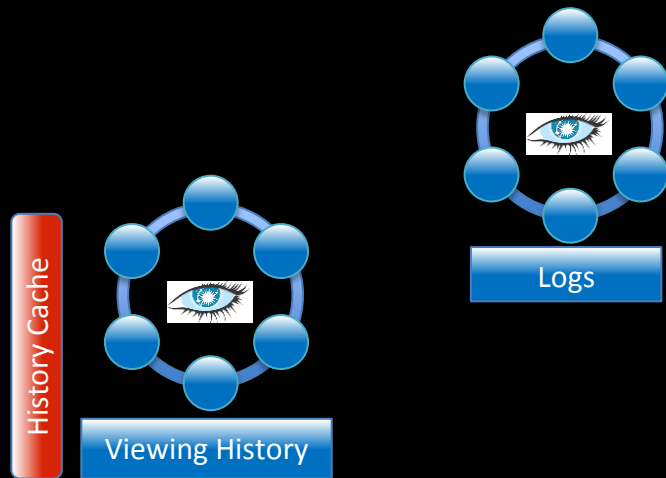
Gen 3 System's Architecture & Scale



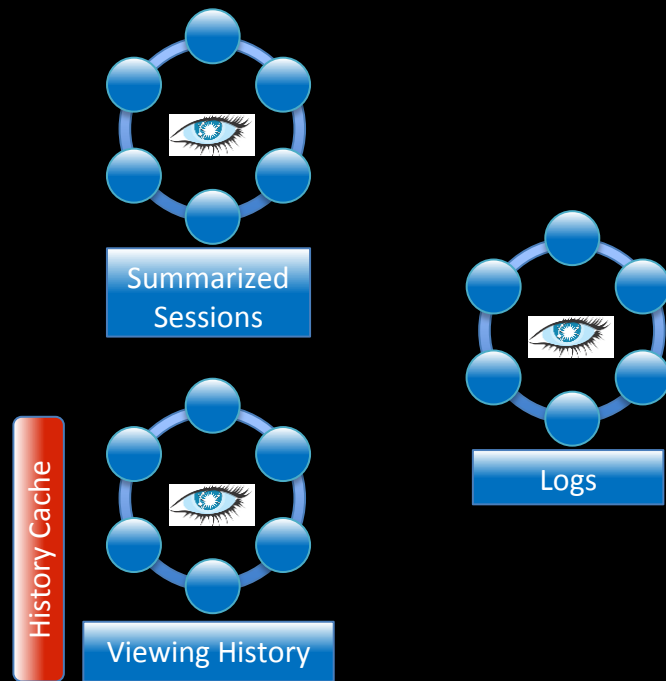
Gen 3 System's Architecture & Scale



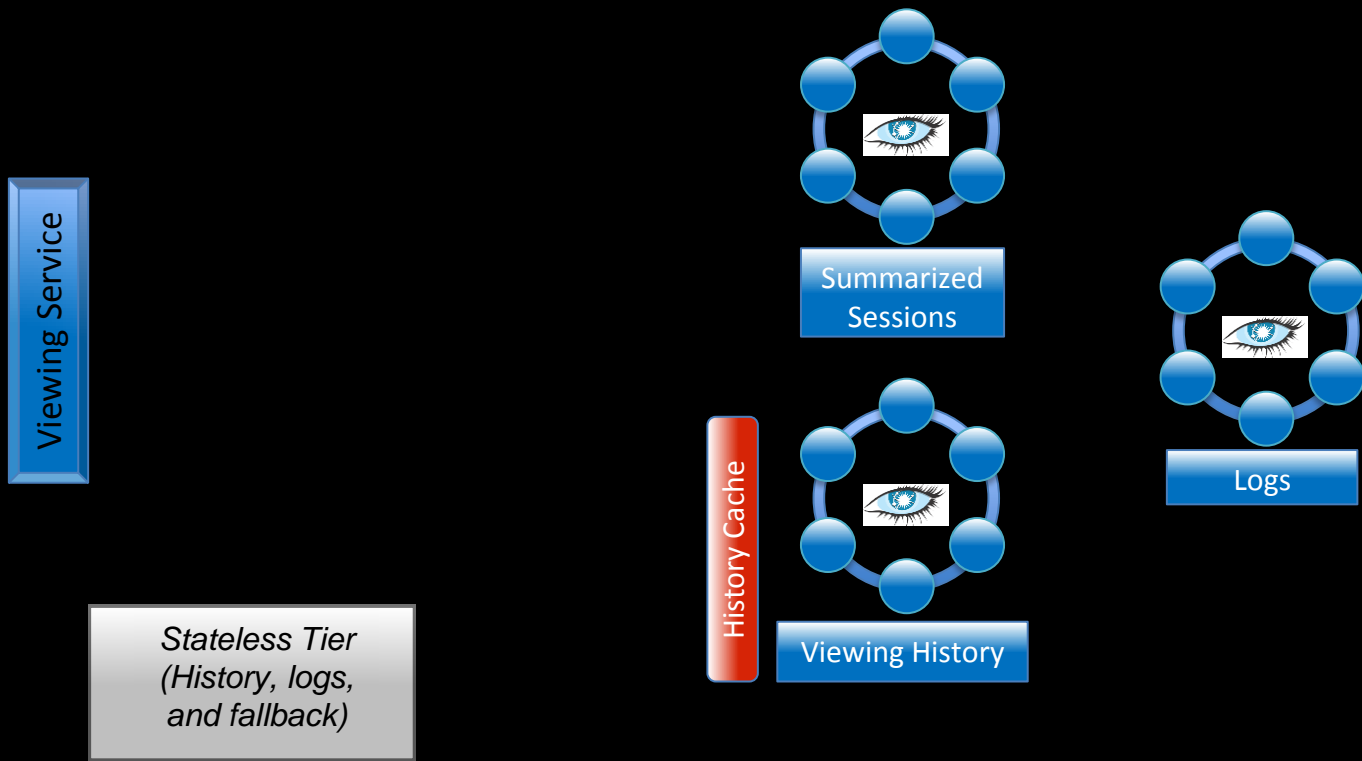
Gen 3 System's Architecture & Scale



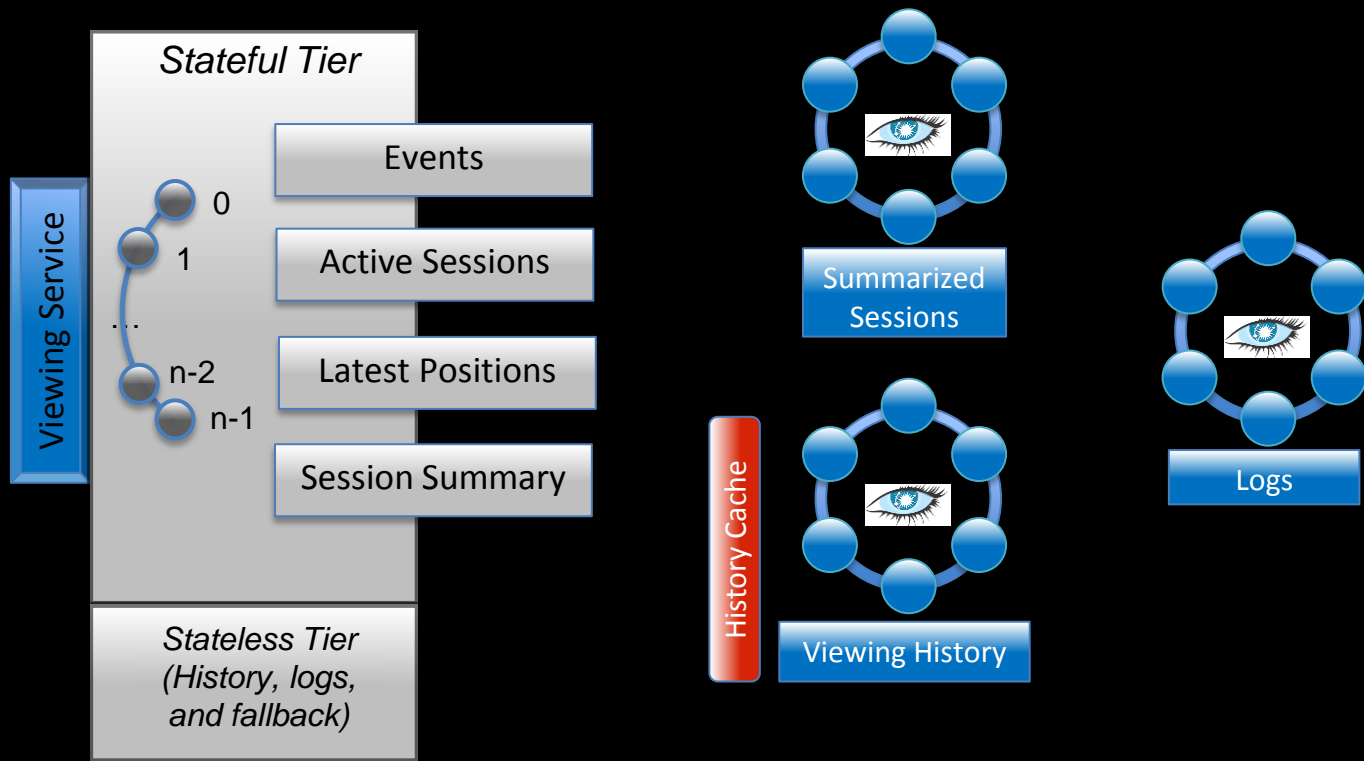
Gen 3 System's Architecture & Scale



Gen 3 System's Architecture & Scale



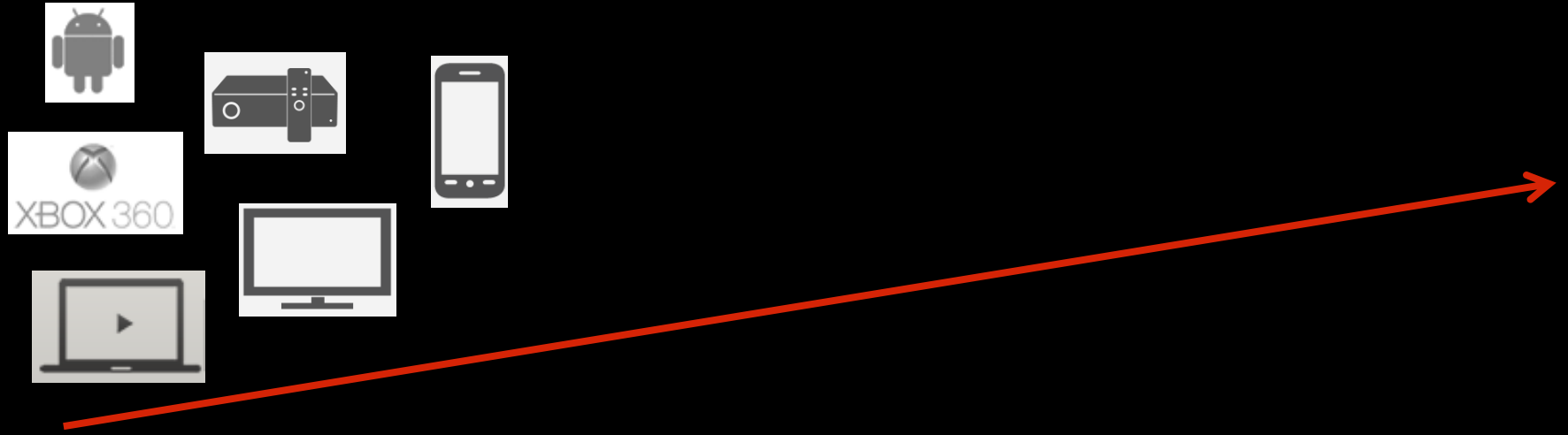
Gen 3 System's Architecture & Scale





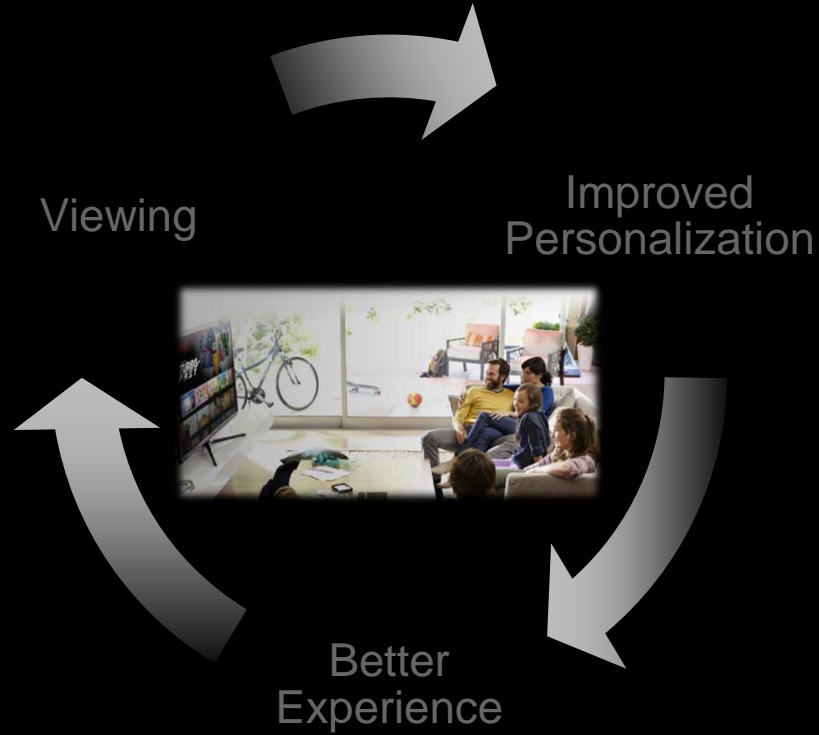
*Time for
Change*

Growth

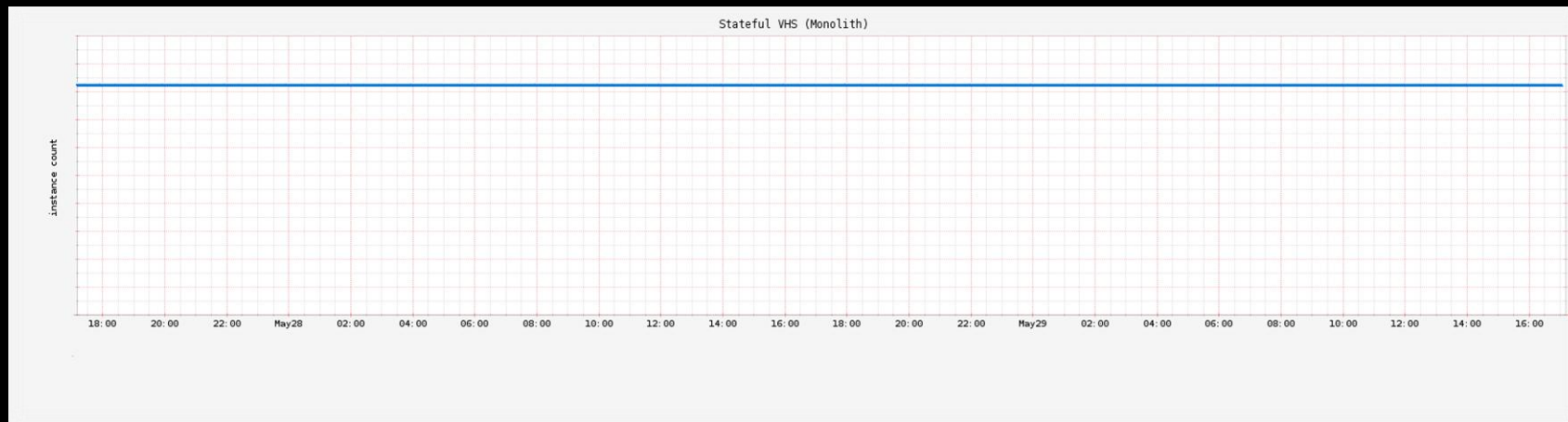


2015

Virtuous Cycle



Stateful Instance Count Over Time



Guiding Lights

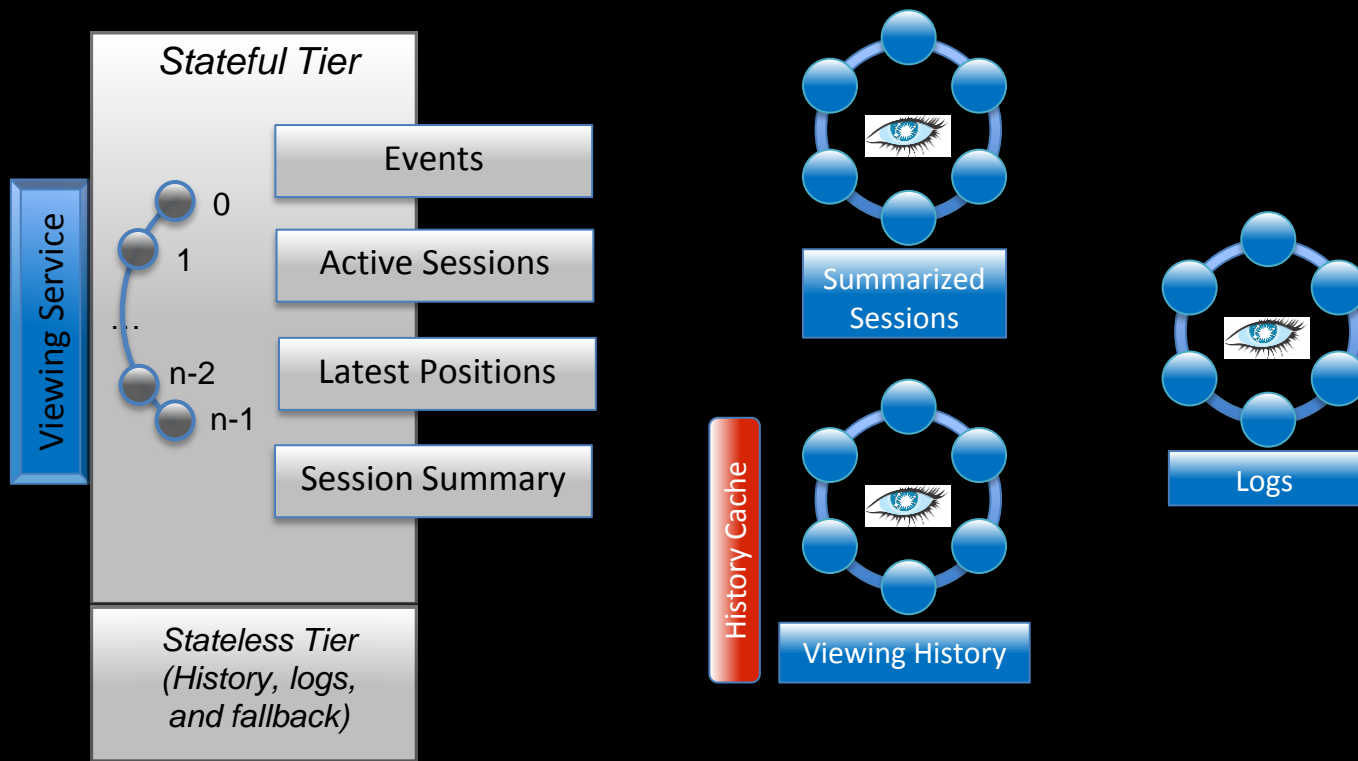




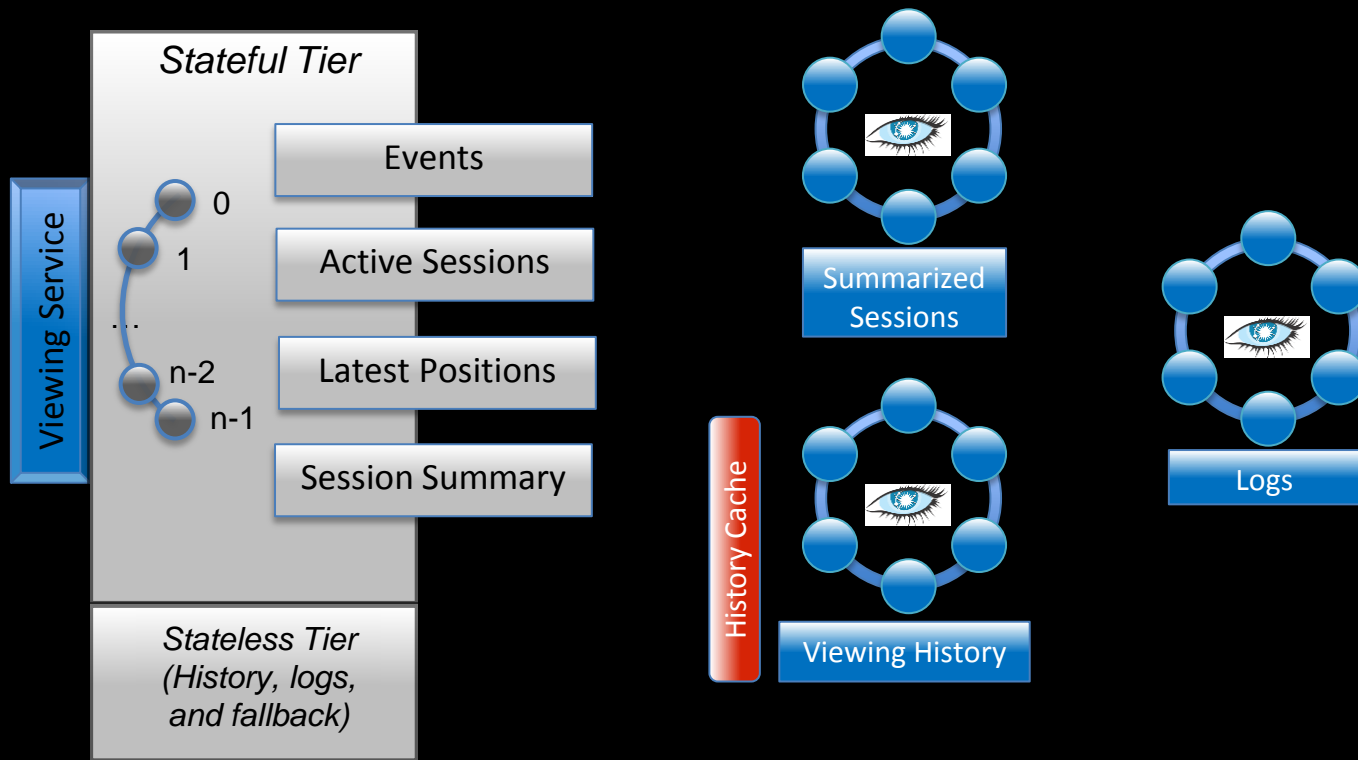




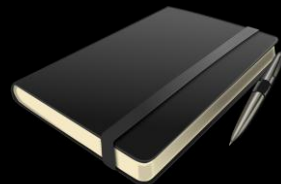
Externalize State...



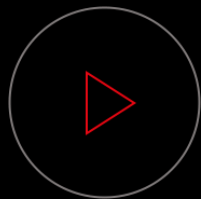
Externalize State... DENIED!



Service Decomposition



Video Bitrate Usage



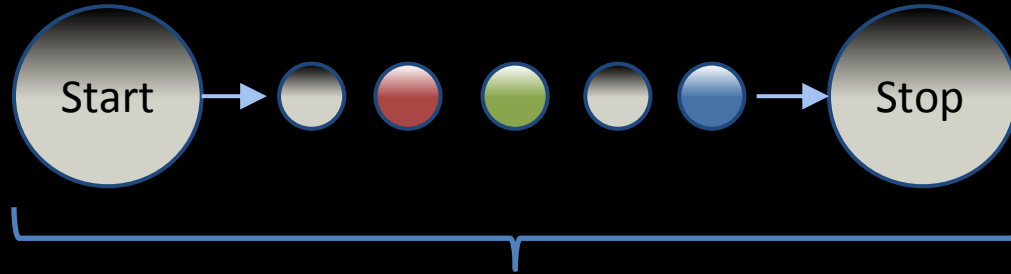
Chapter 34 43m

A hurricane endangers more than just the entire East Coast and Frank must make a difficult choice.

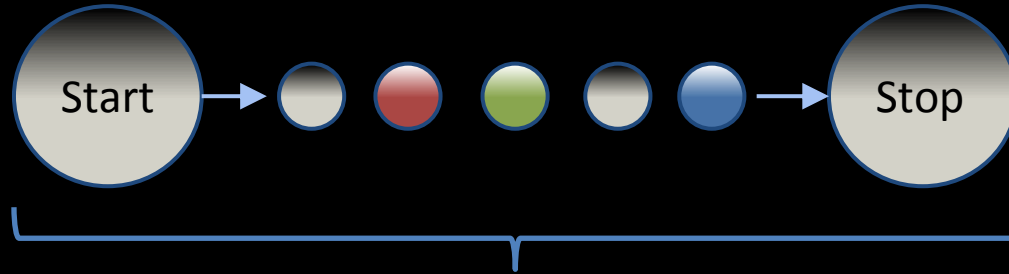
Continue Watching for Matt



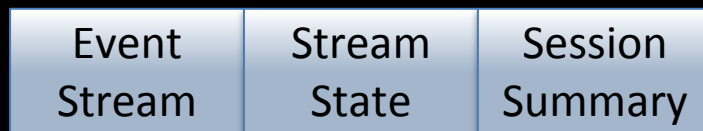
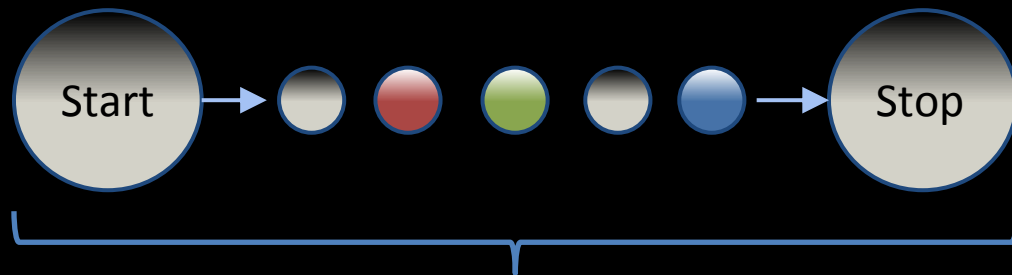
Service Decomposition



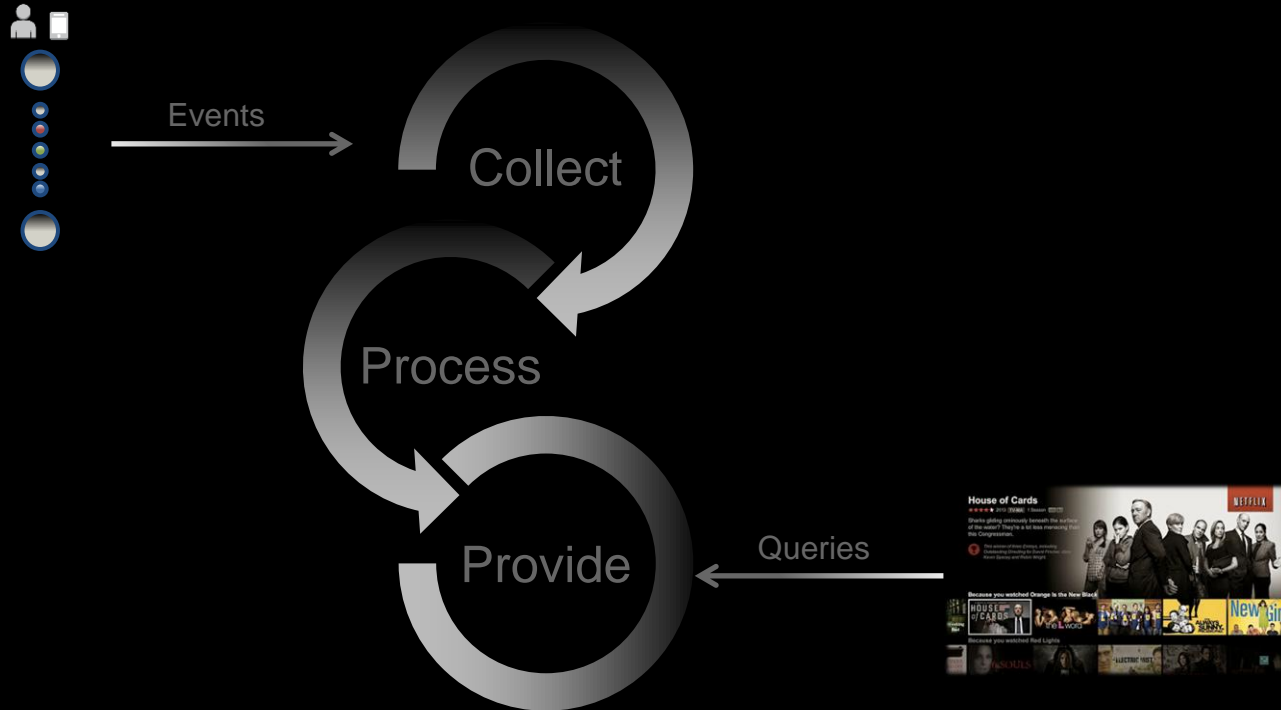
Service Decomposition



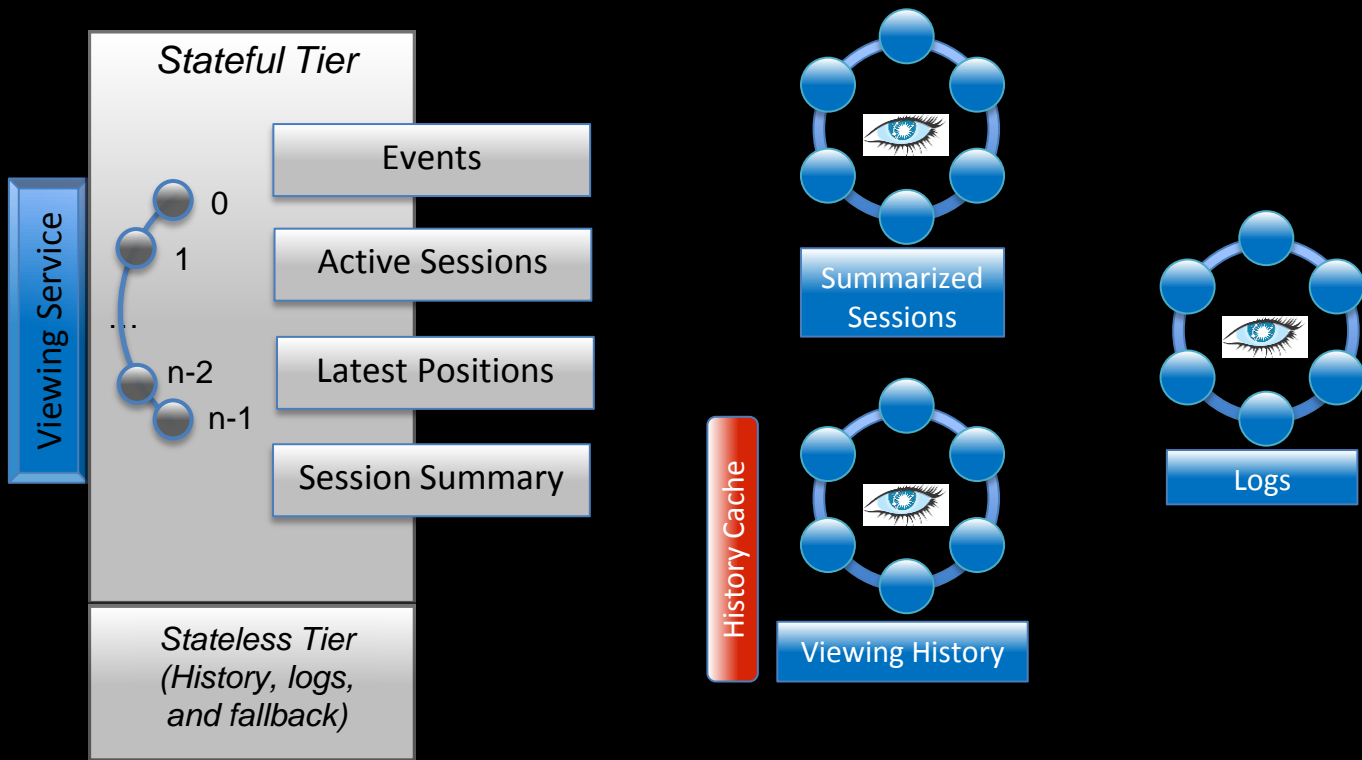
Service Decomposition



Service Decomposition



Gen 3 Review



Gen 4 Generic Architecture

Collector

Processor

Provider

Gen 4 Generic Architecture

Collector

Processor

Provider

Queue

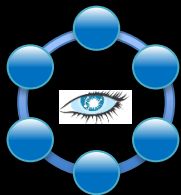
Gen 4 Generic Architecture

Collector

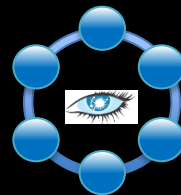
Processor

Provider

Queue

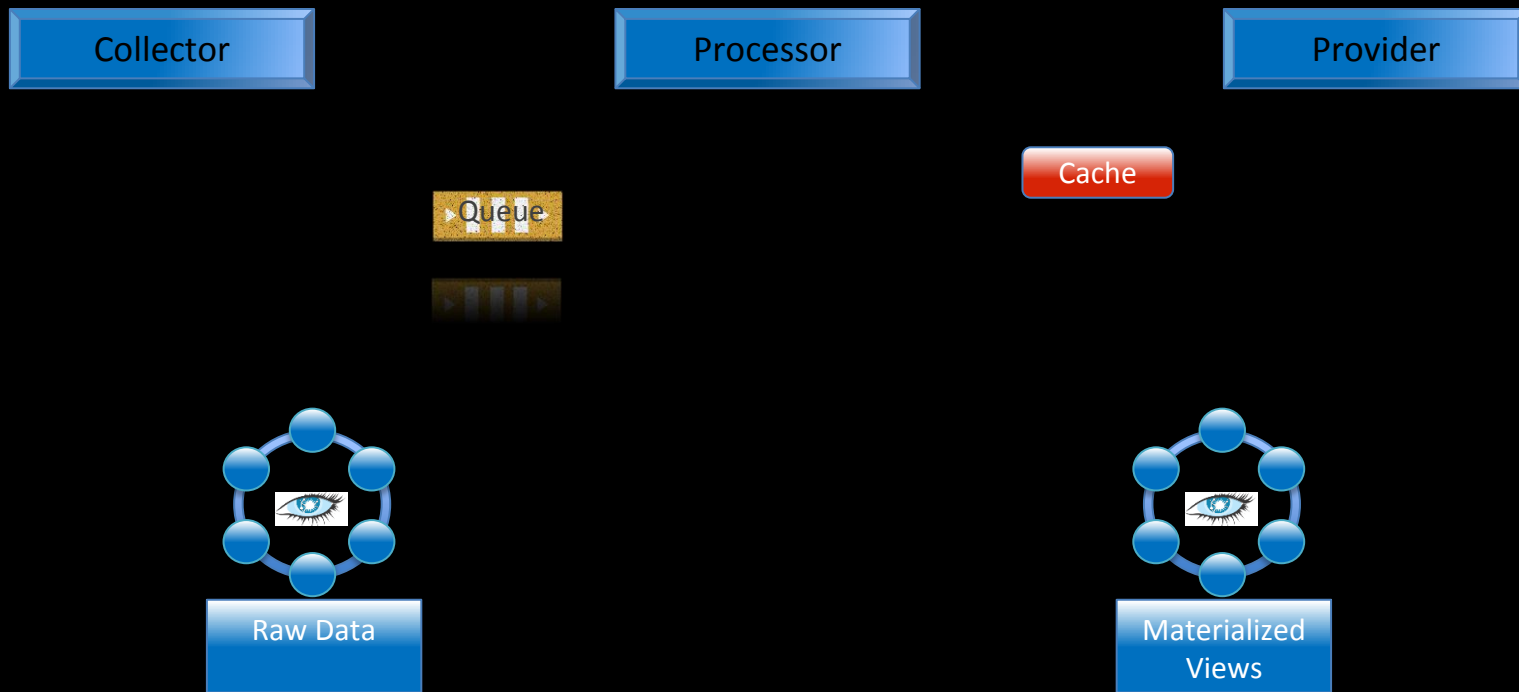


Raw Data

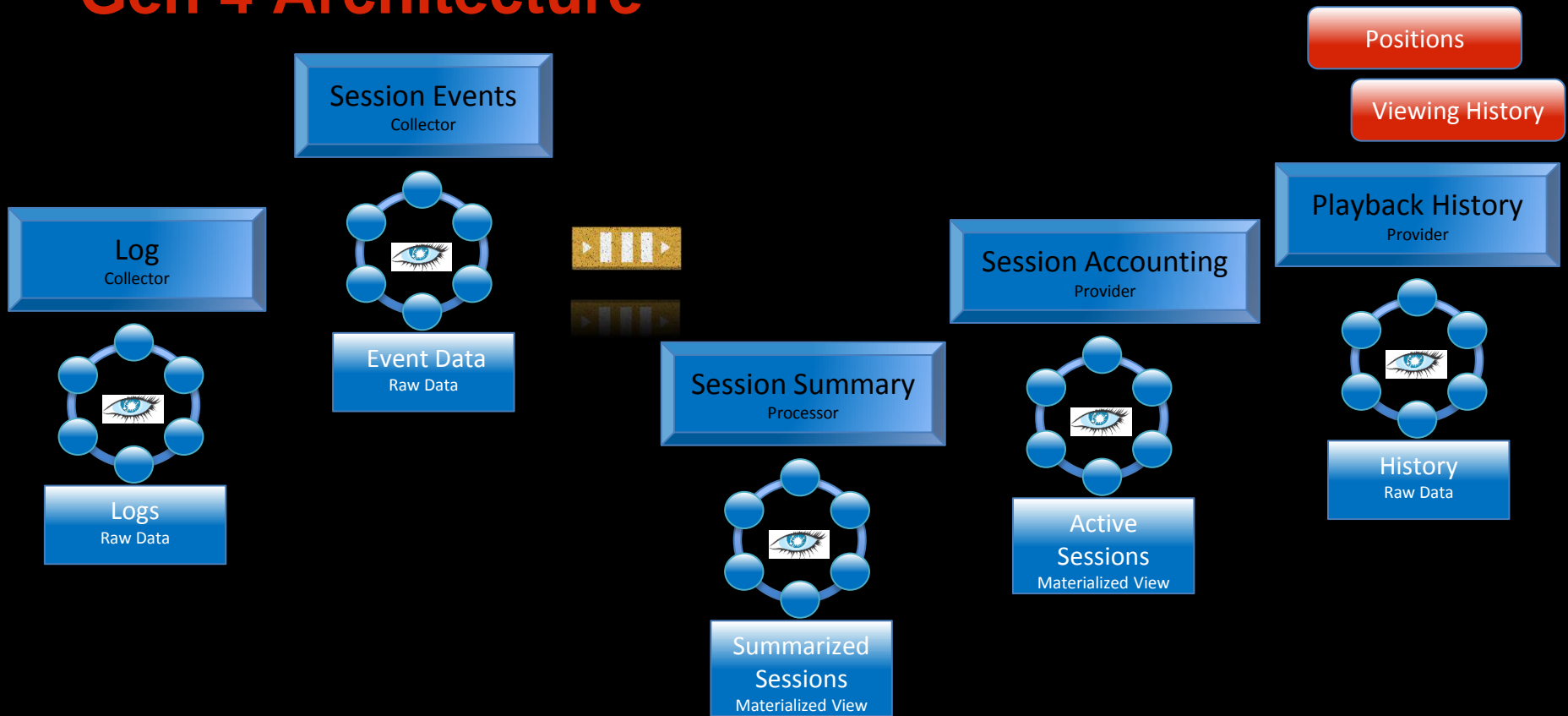


Materialized Views

Gen 4 Generic Architecture



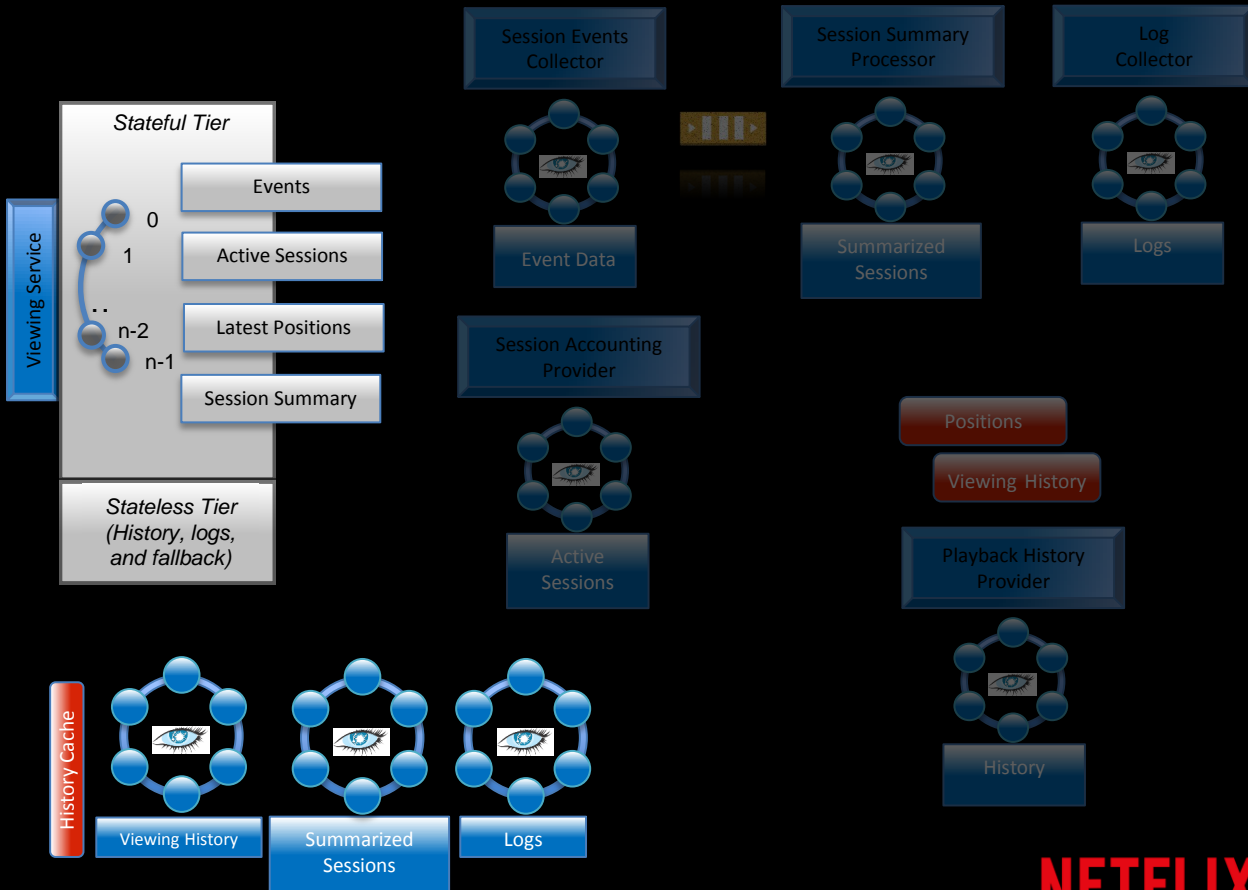
Gen 4 Architecture



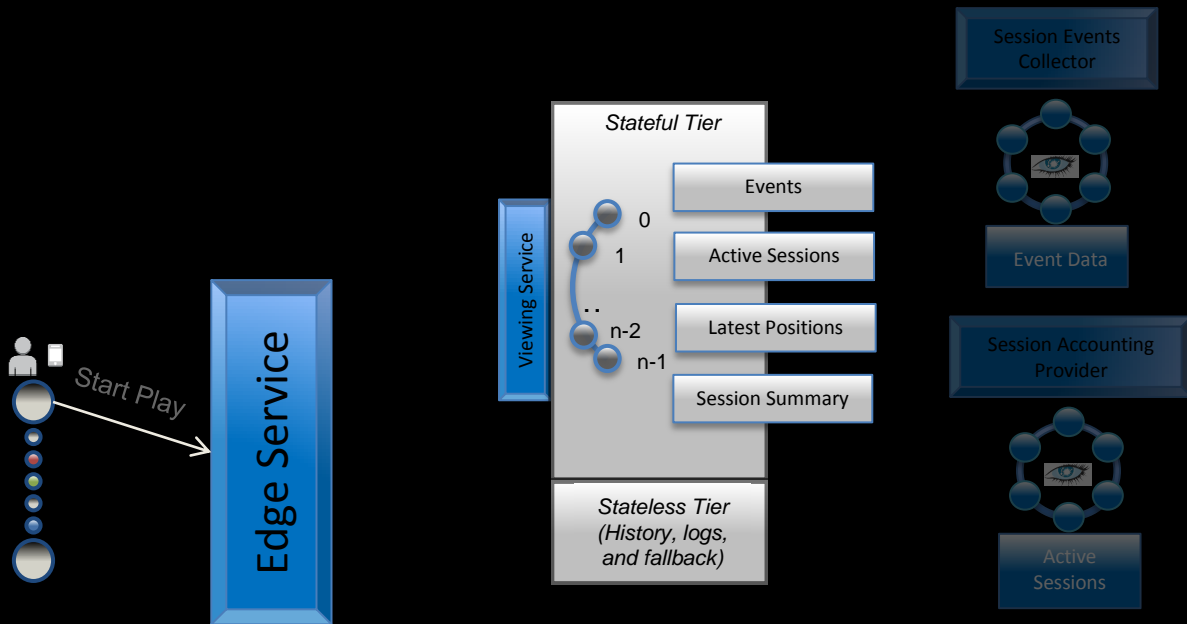
Shadow Testing



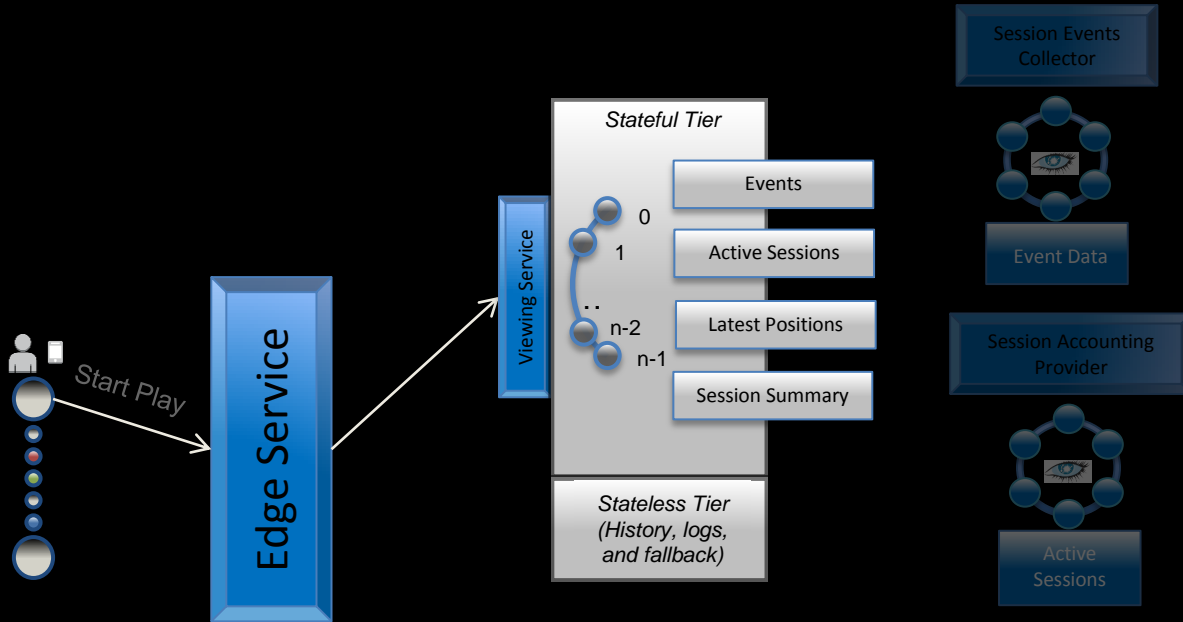
Edge Service



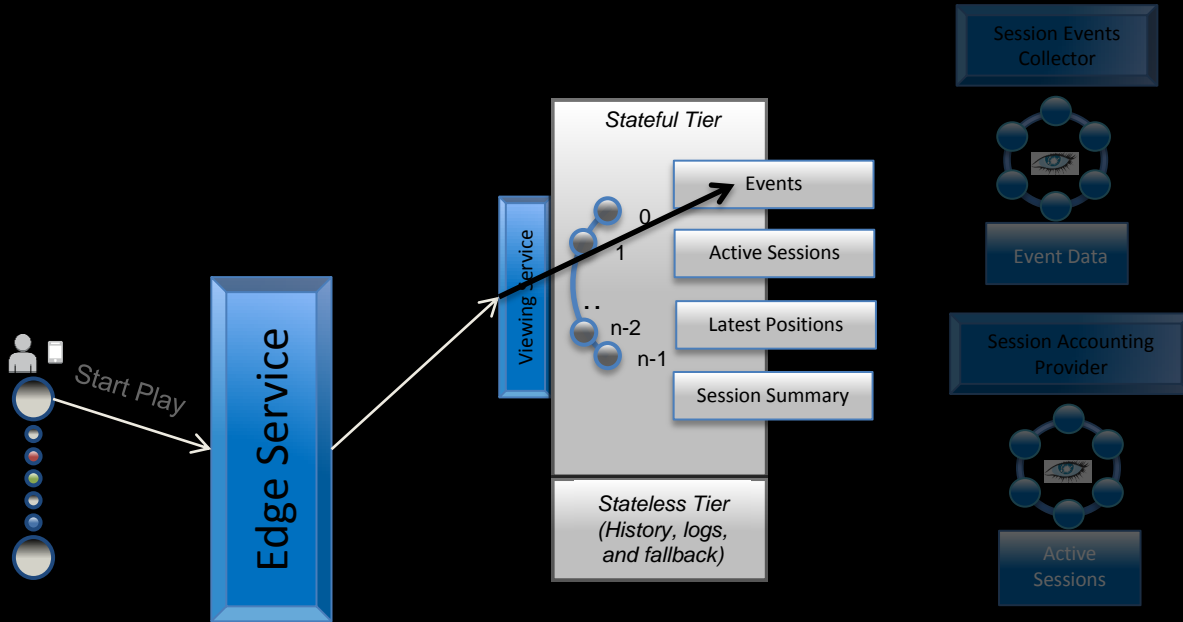
Shadow Testing: Start Play Event



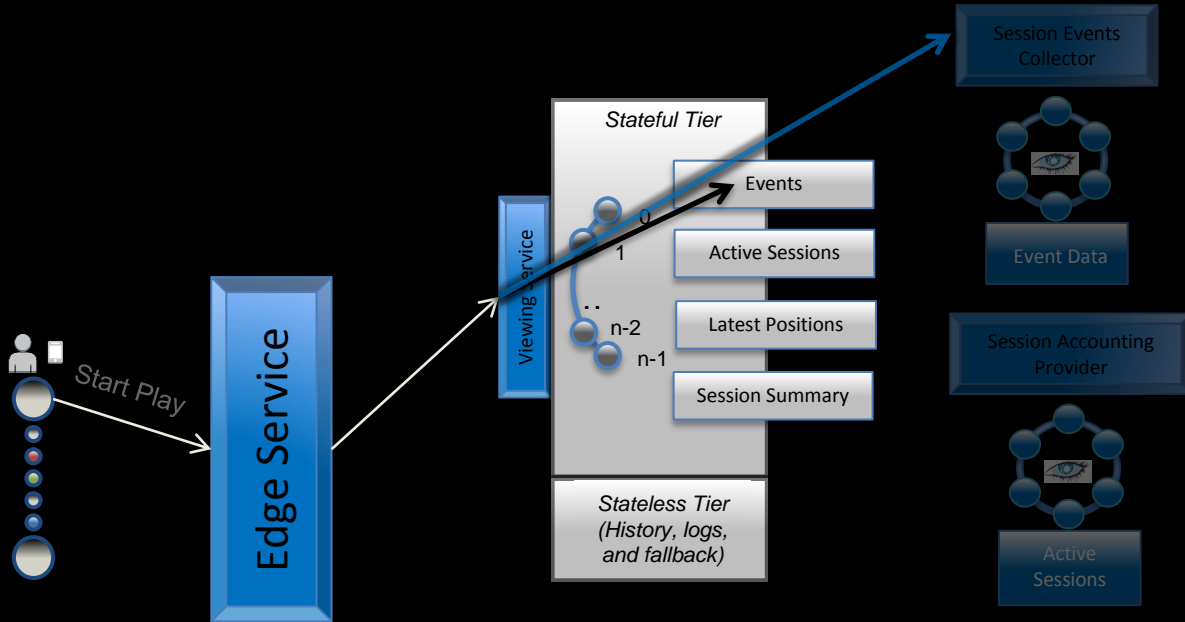
Shadow Testing: Start Play Event



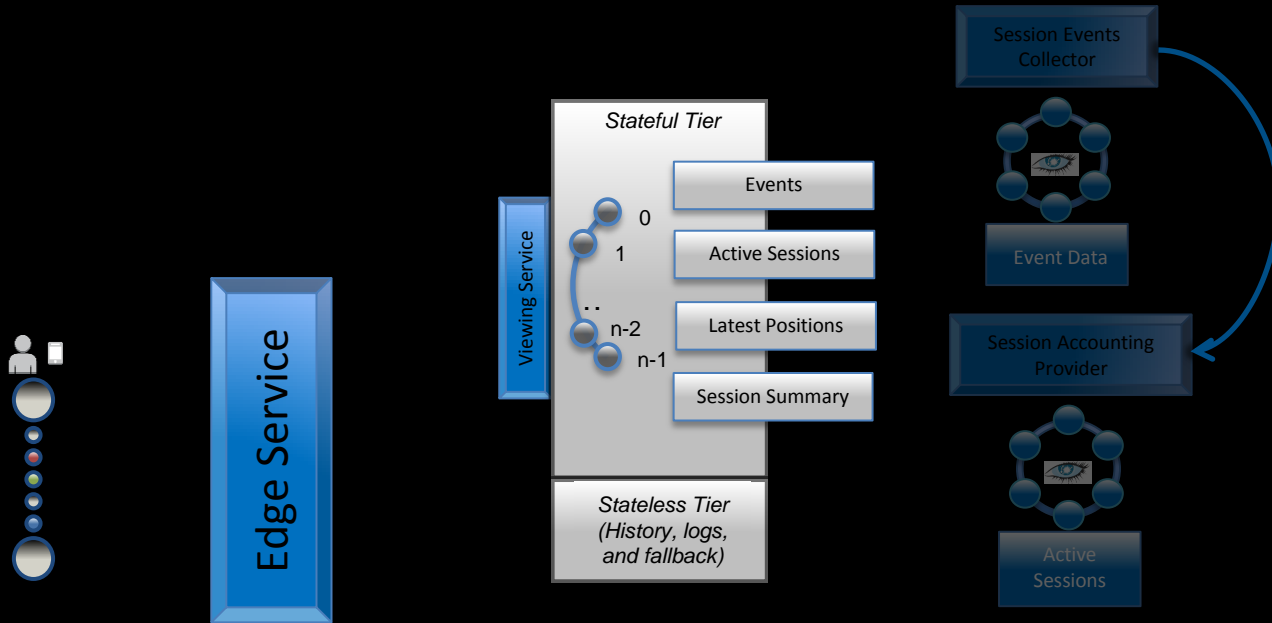
Shadow Testing: Start Play Event



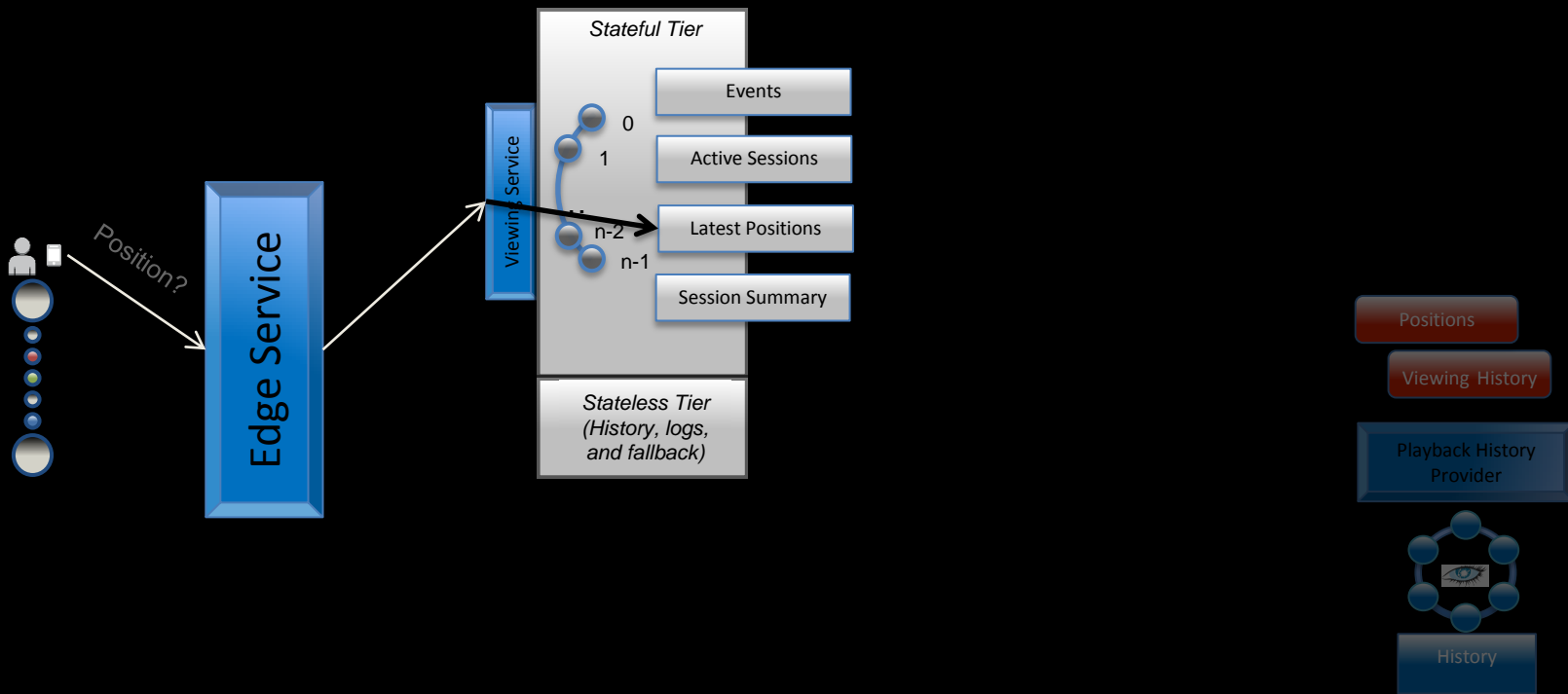
Shadow Testing: Start Play Event



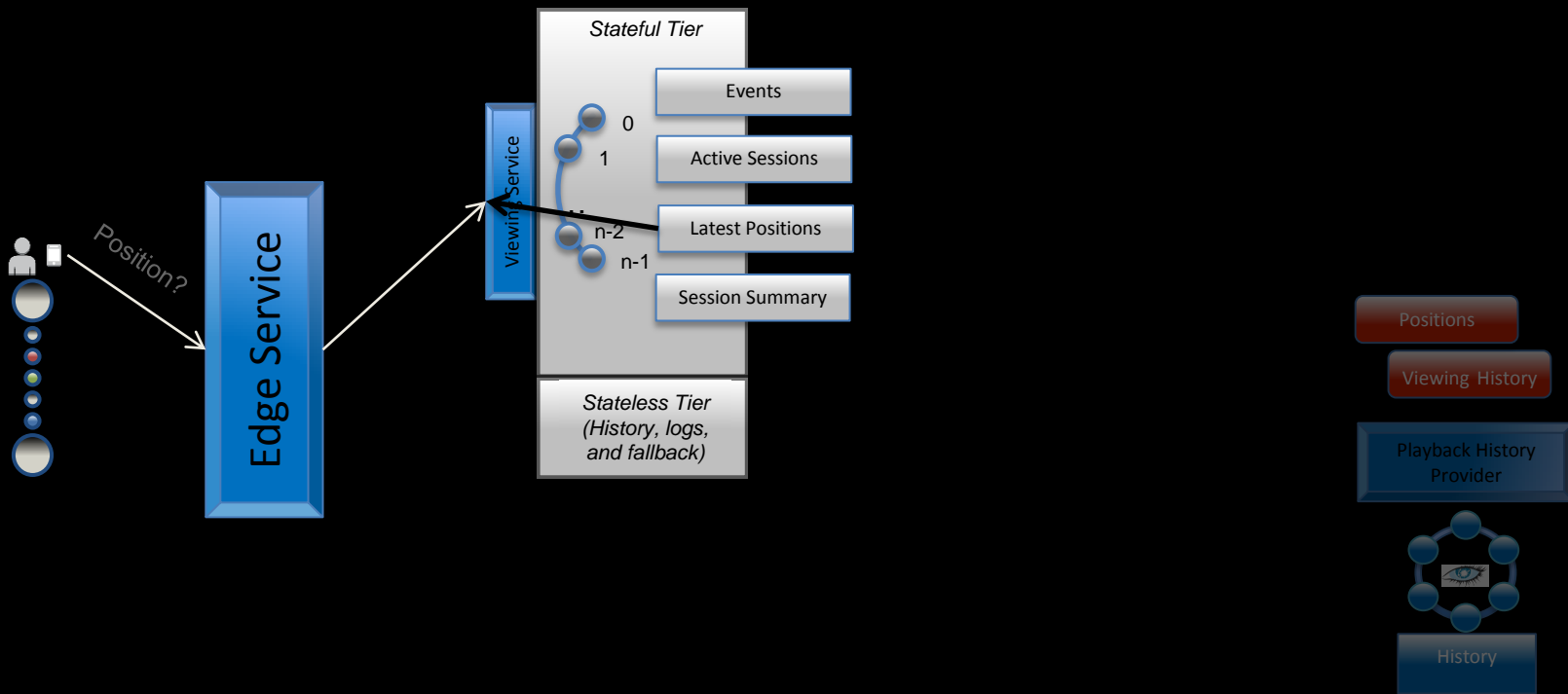
Shadow Testing: Start Play Event



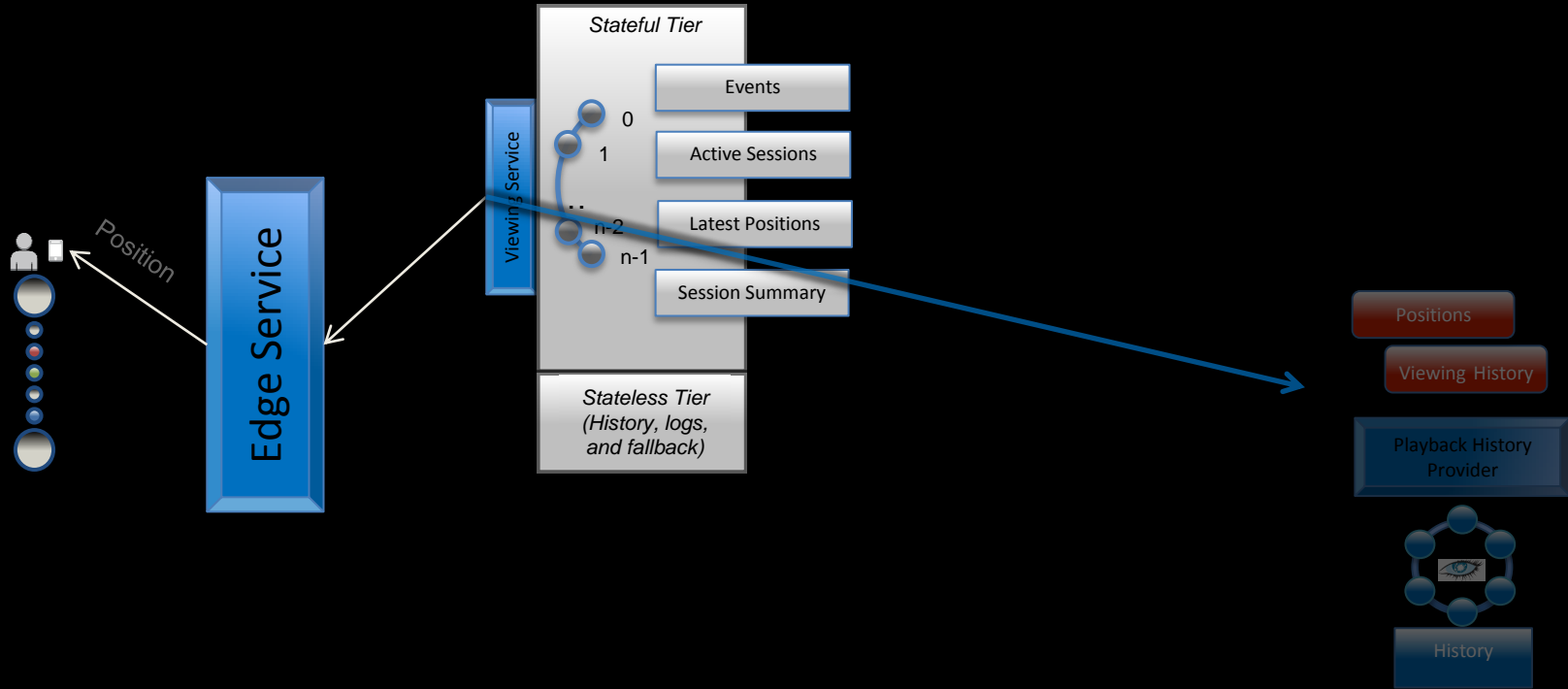
Shadow Testing: Read Latest Position



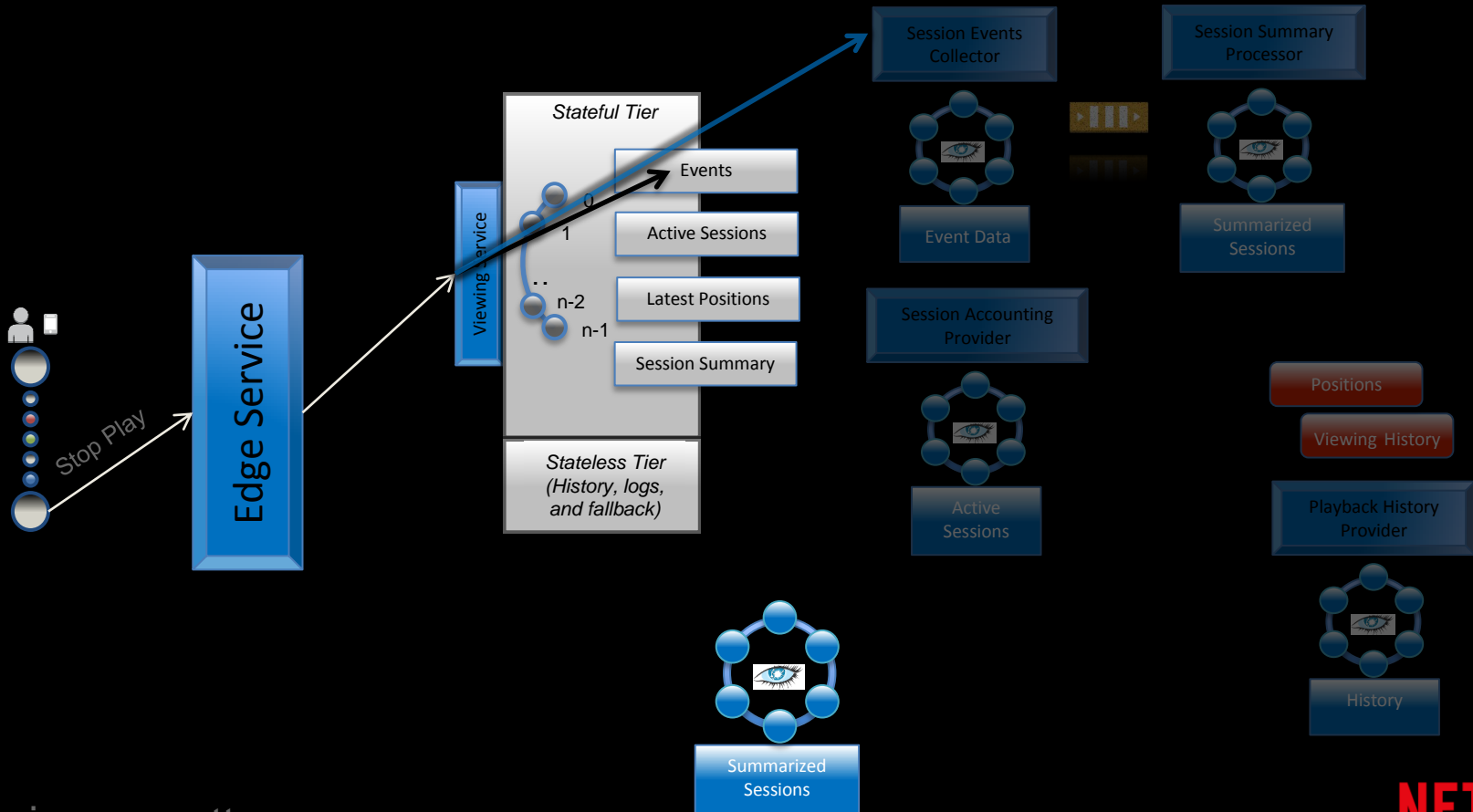
Shadow Testing: Read Latest Position



Shadow Testing: Read Latest Position



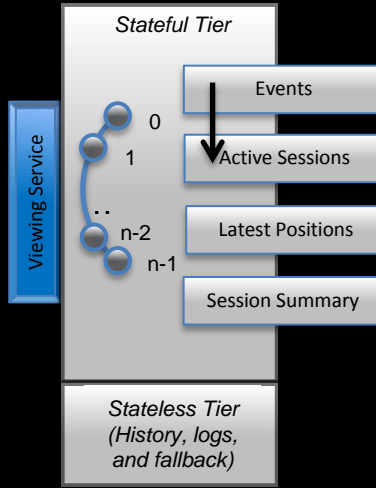
Shadow Testing: Stop Event



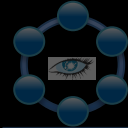
Shadow Testing: Stop Event



Edge Service

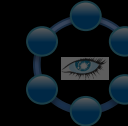


Session Events Collector



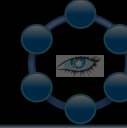
Event Data

Session Accounting Provider



Active Sessions

Session Summary Processor

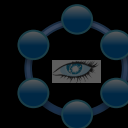


Summarized Sessions

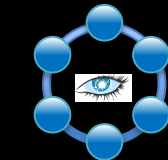
Positions

Viewing History

Playback History Provider

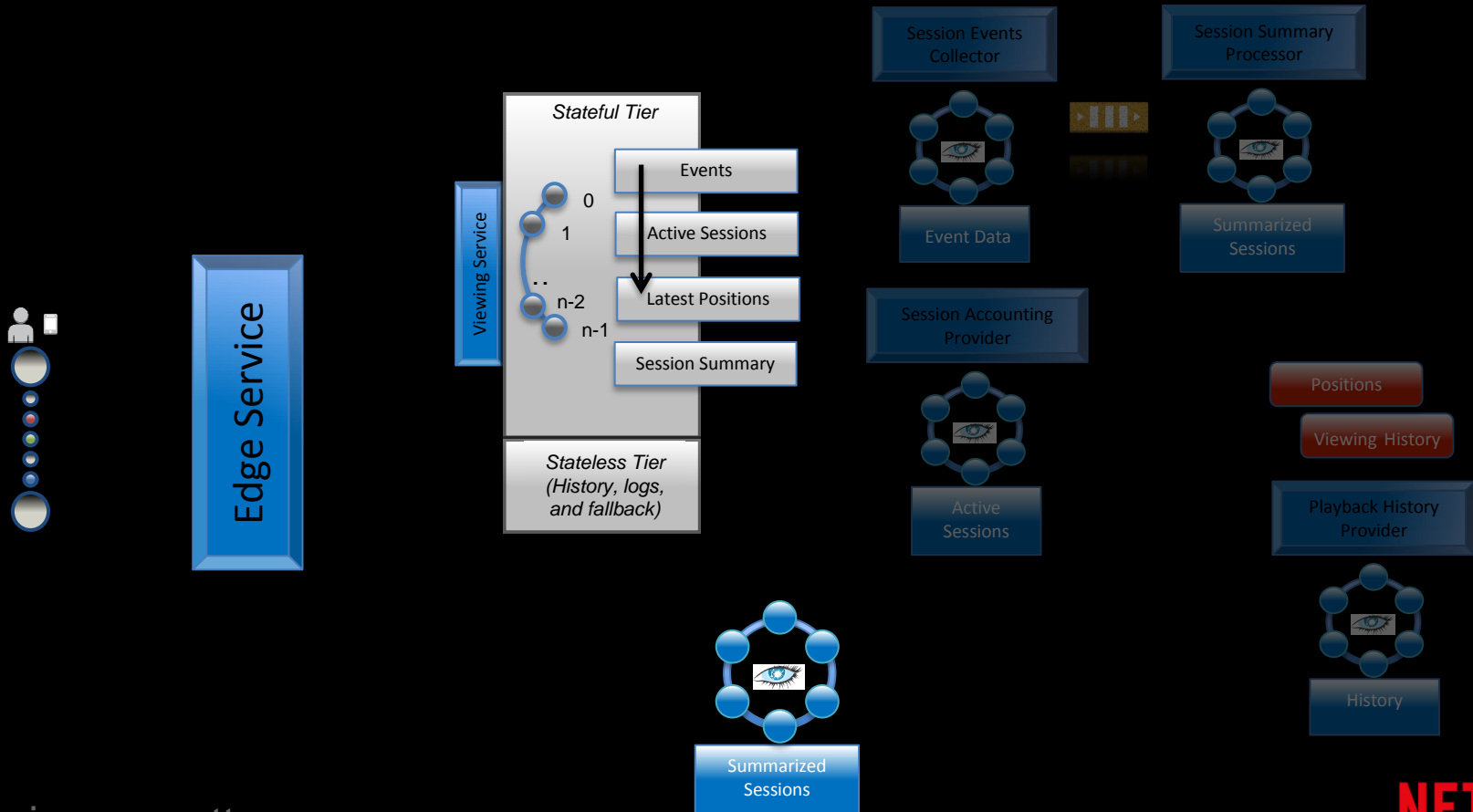


History

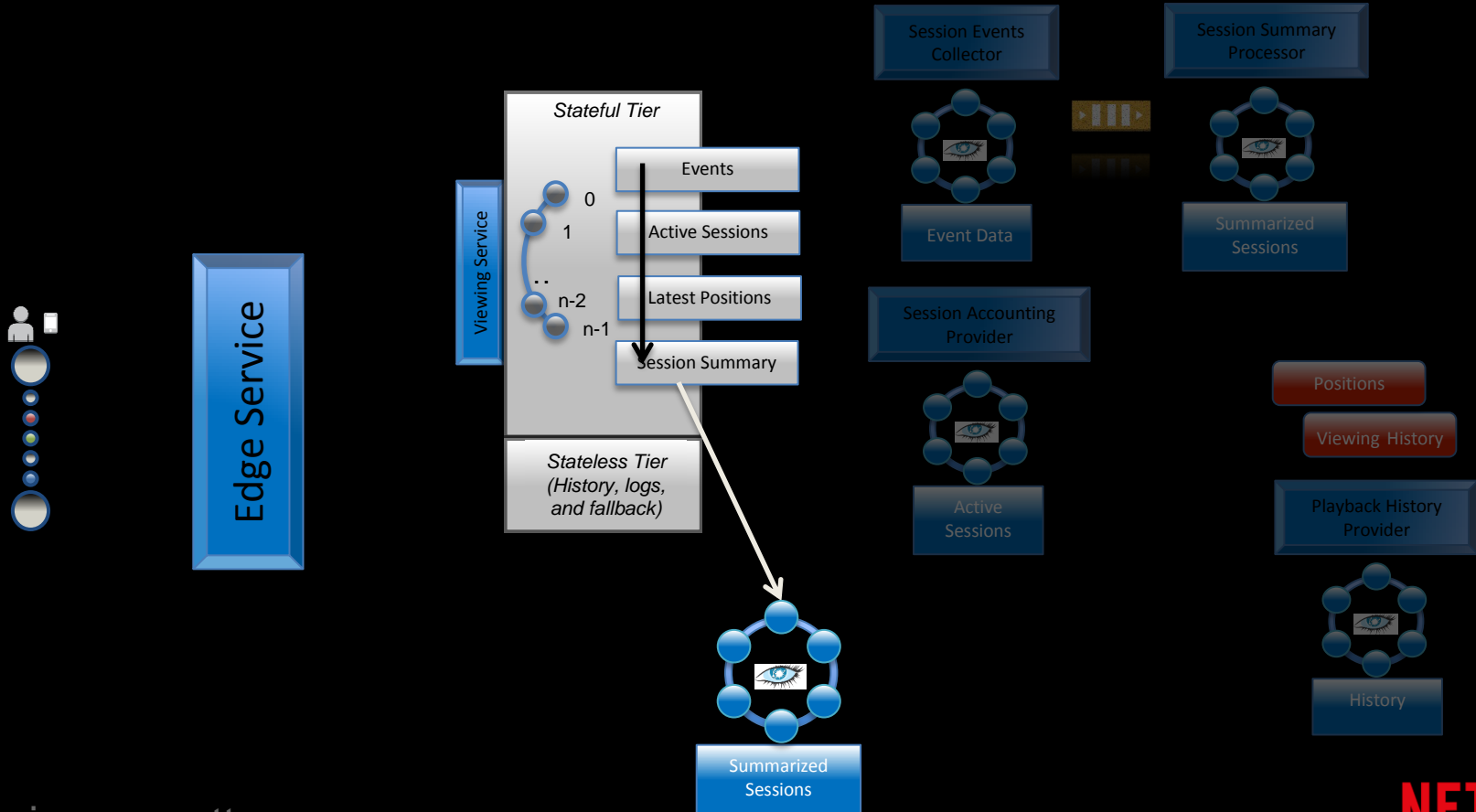


Summarized Sessions

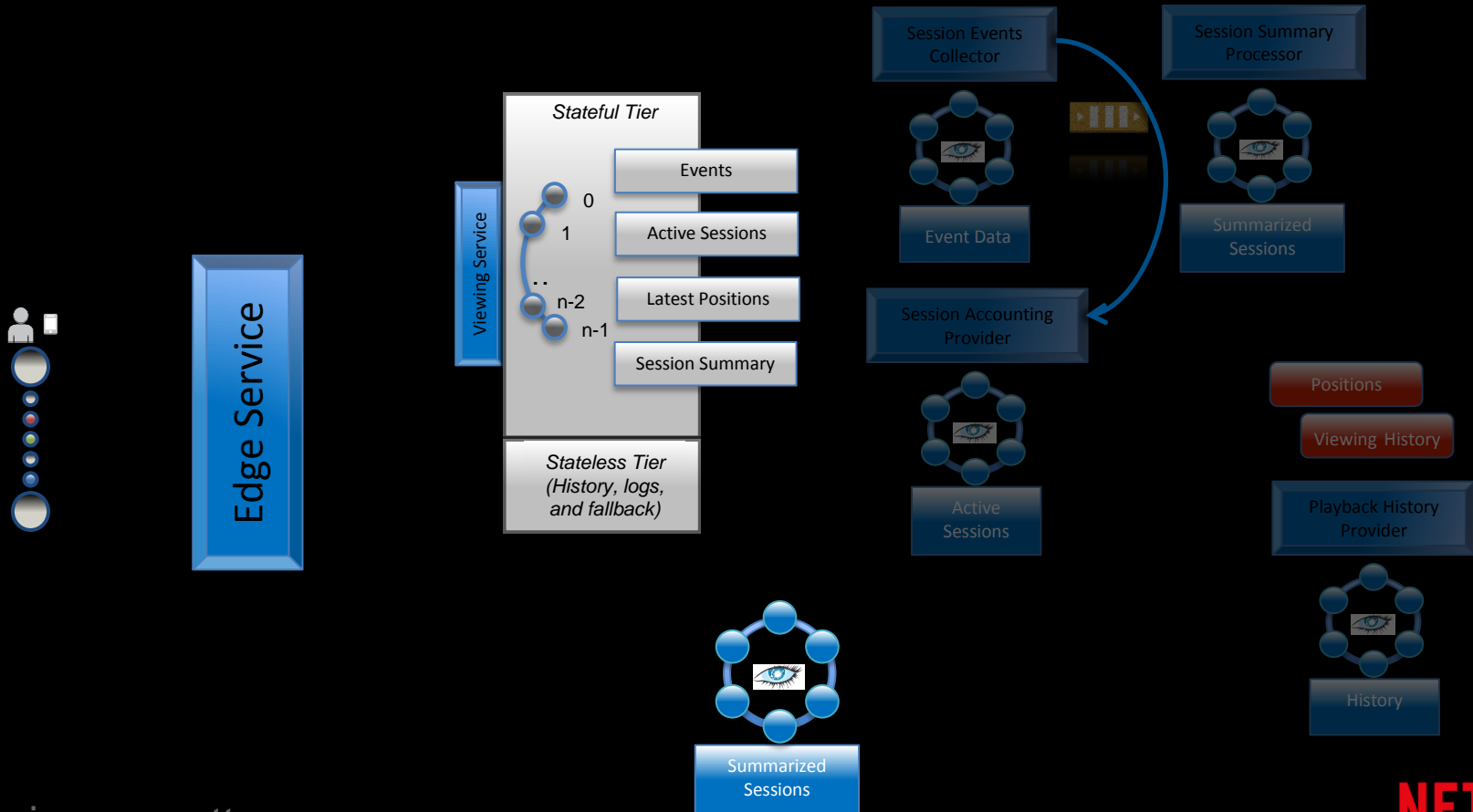
Shadow Testing: Stop Event



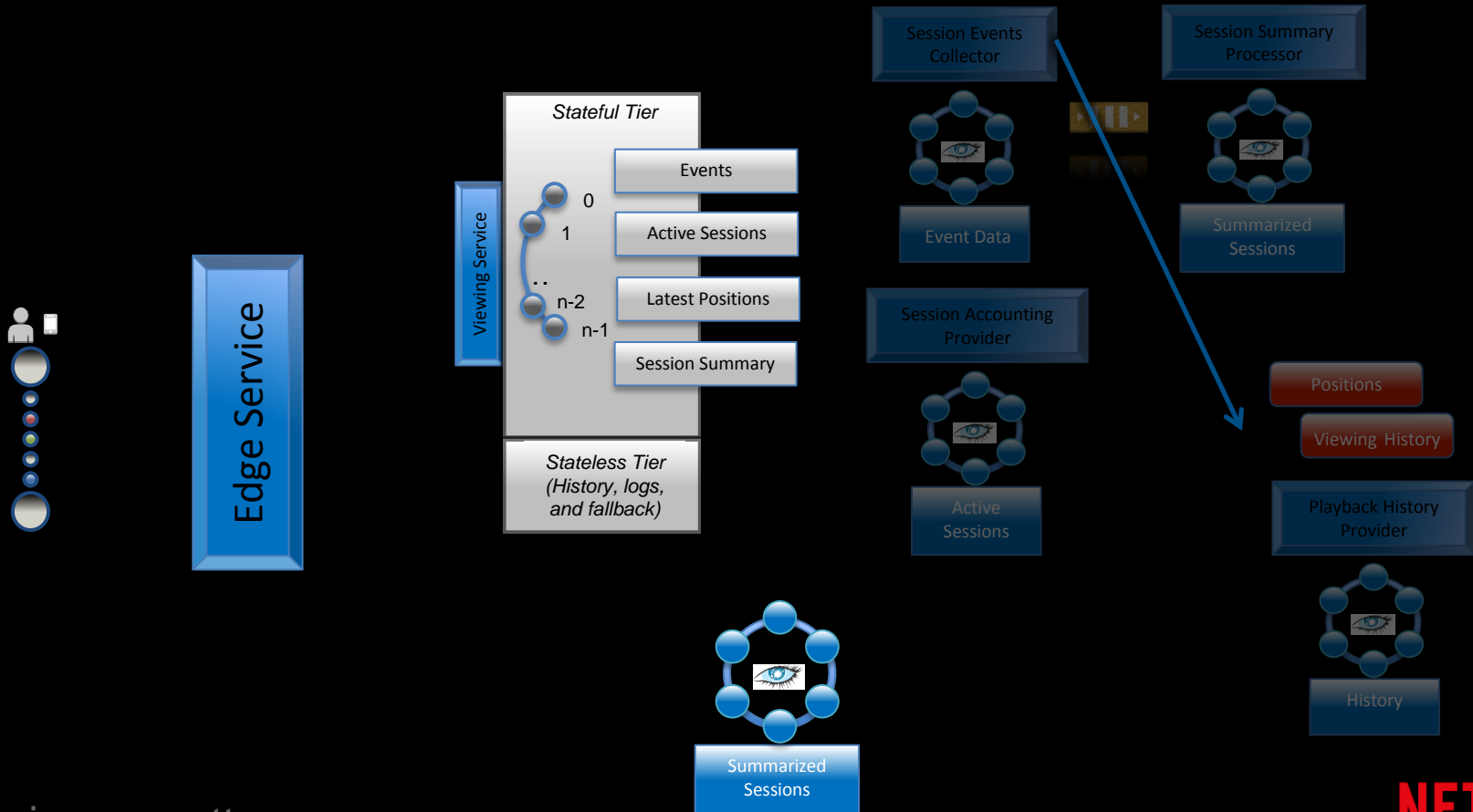
Shadow Testing: Stop Event



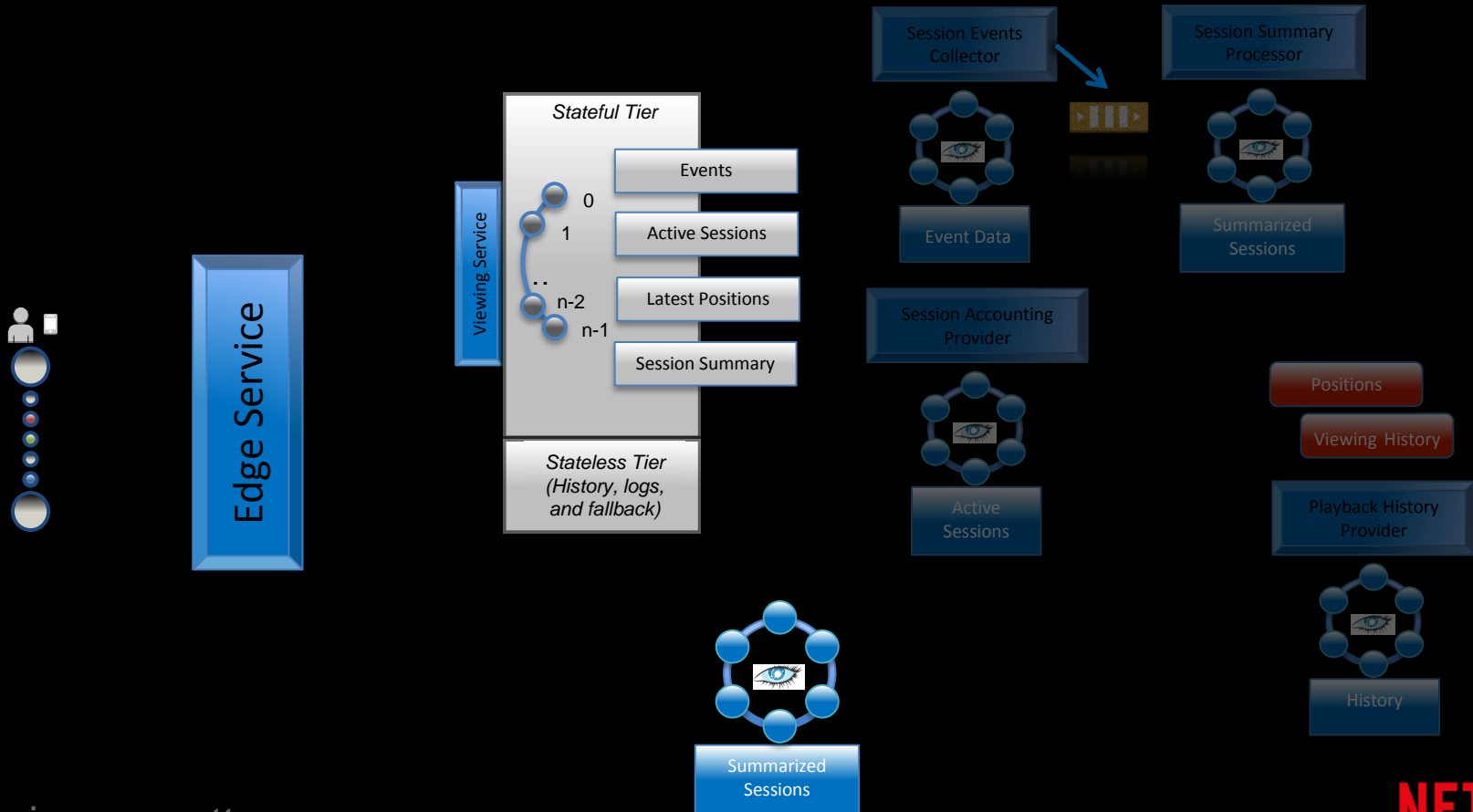
Shadow Testing: Stop Event



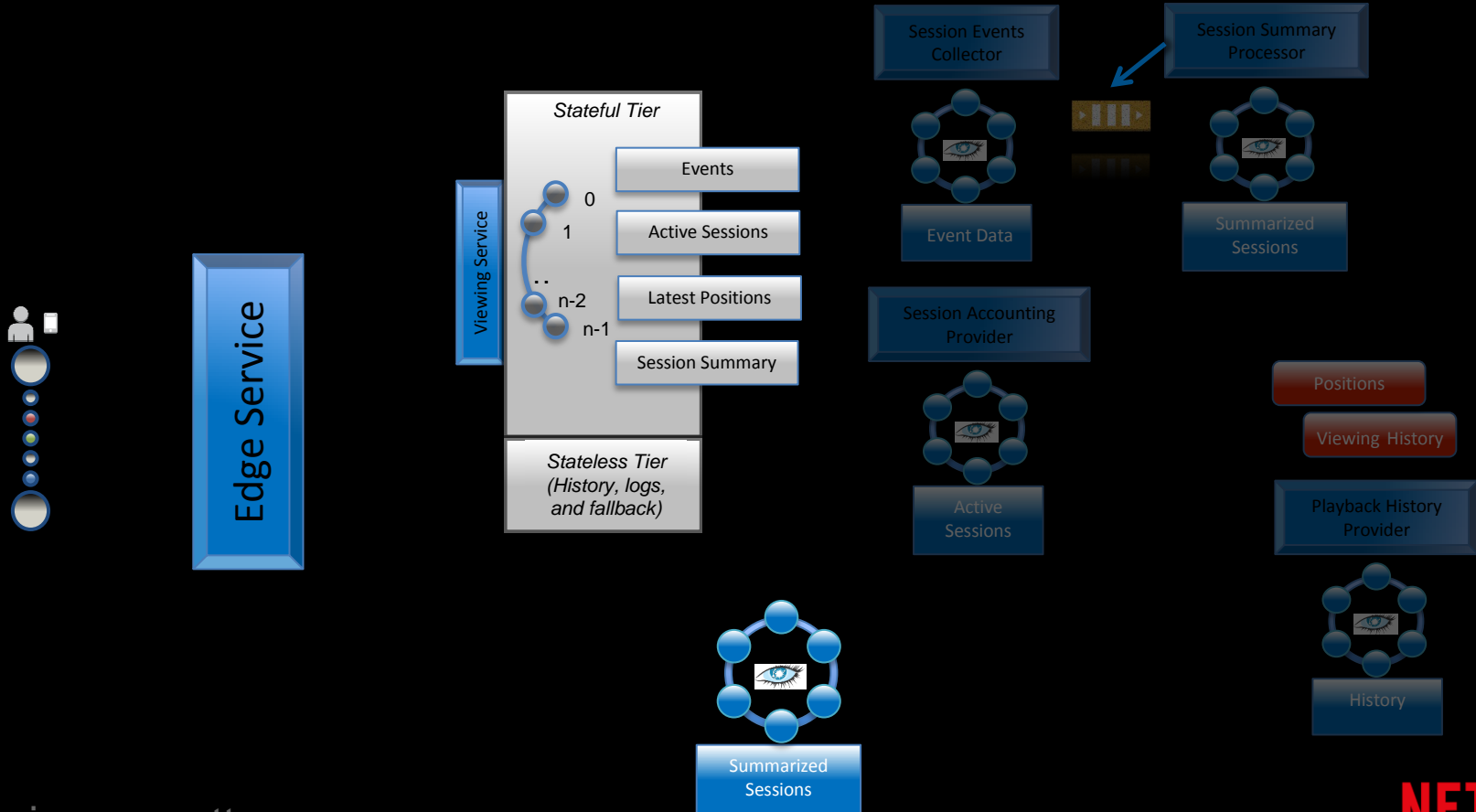
Shadow Testing: Stop Event



Shadow Testing: Stop Event



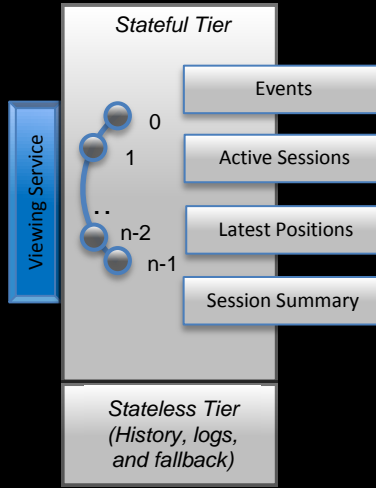
Shadow Testing: Stop Event



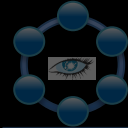
Shadow Testing: Stop Event



Edge Service

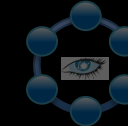


Session Events Collector



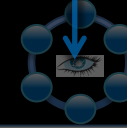
Event Data

Session Accounting Provider



Active Sessions

Session Summary Processor

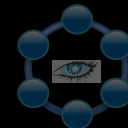


Summarized Sessions

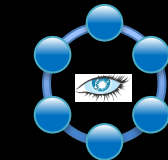
Positions

Viewing History

Playback History Provider

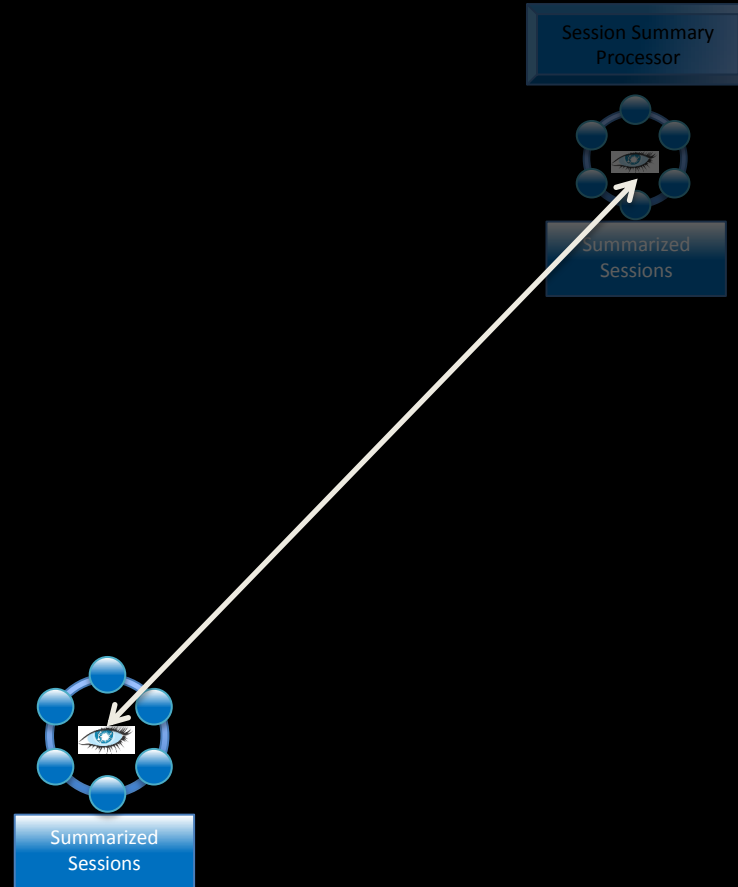


History



Summarized Sessions

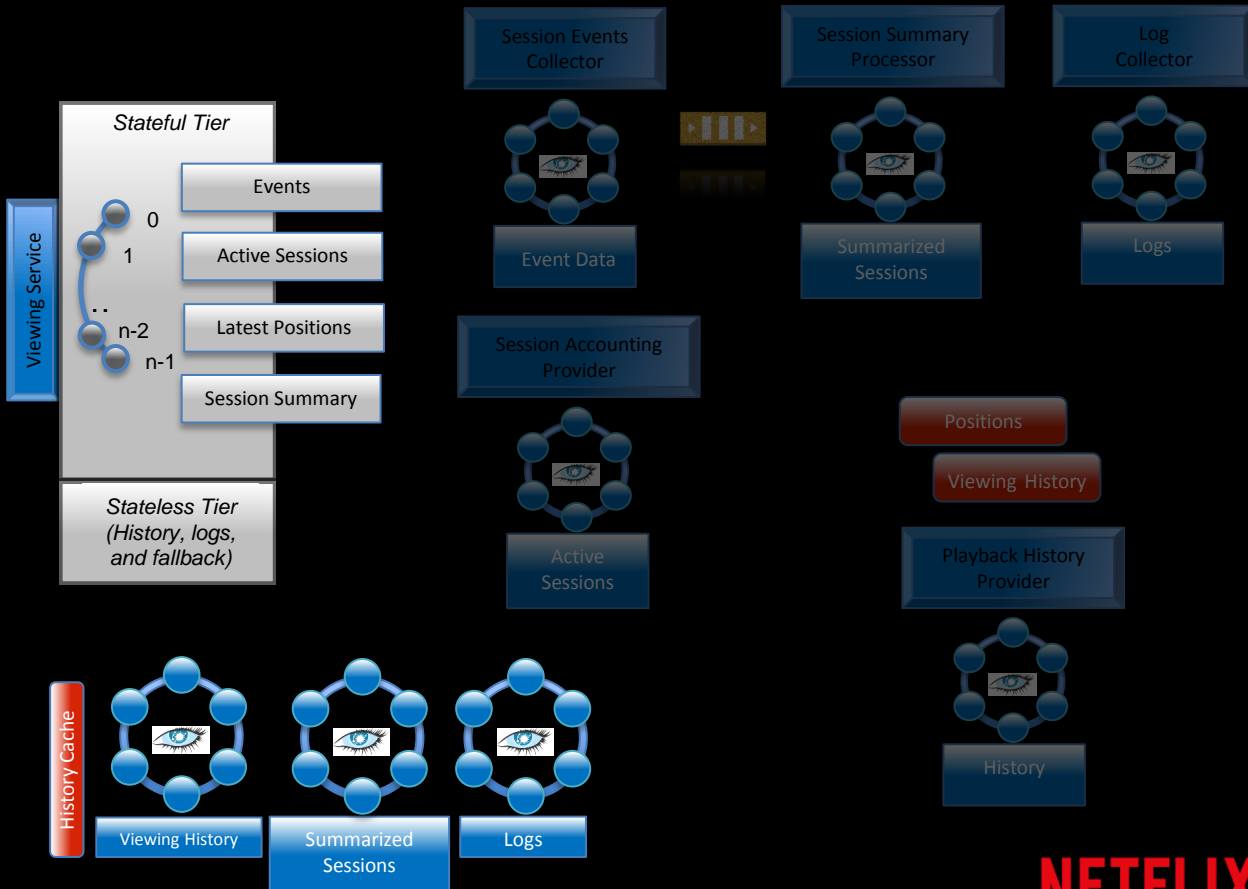
Shadow Testing: Stop Event



Shadow Testing



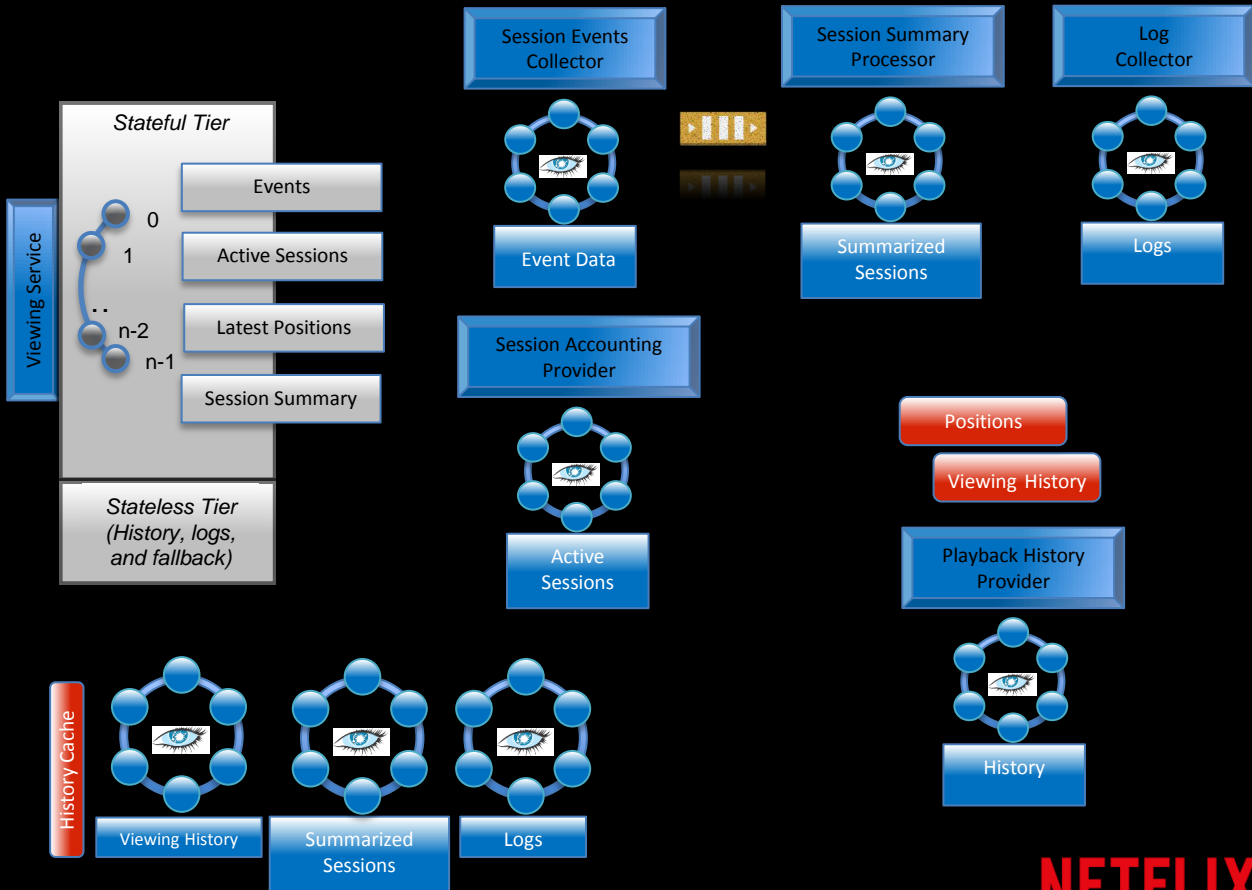
Edge Service



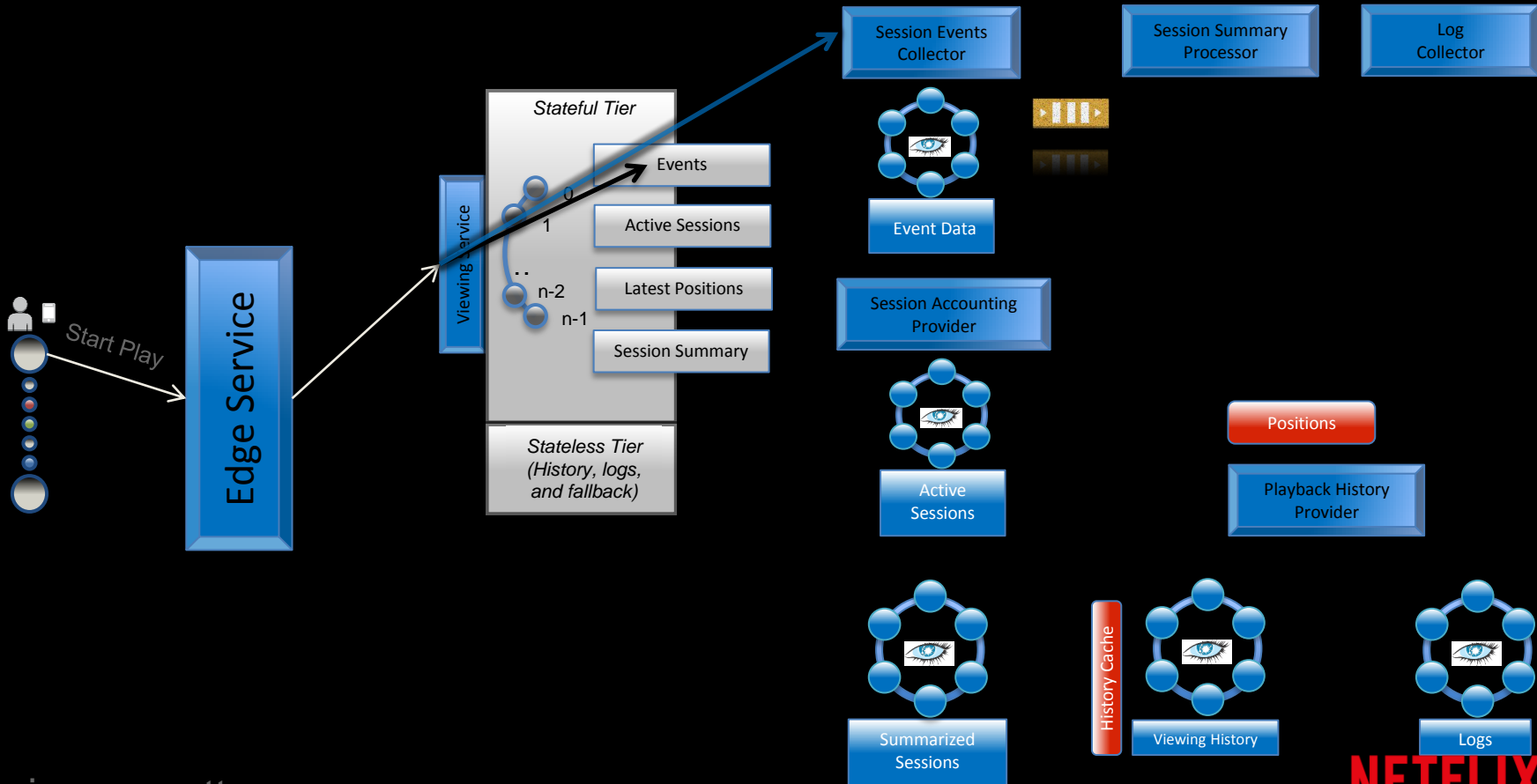
Traffic Dial



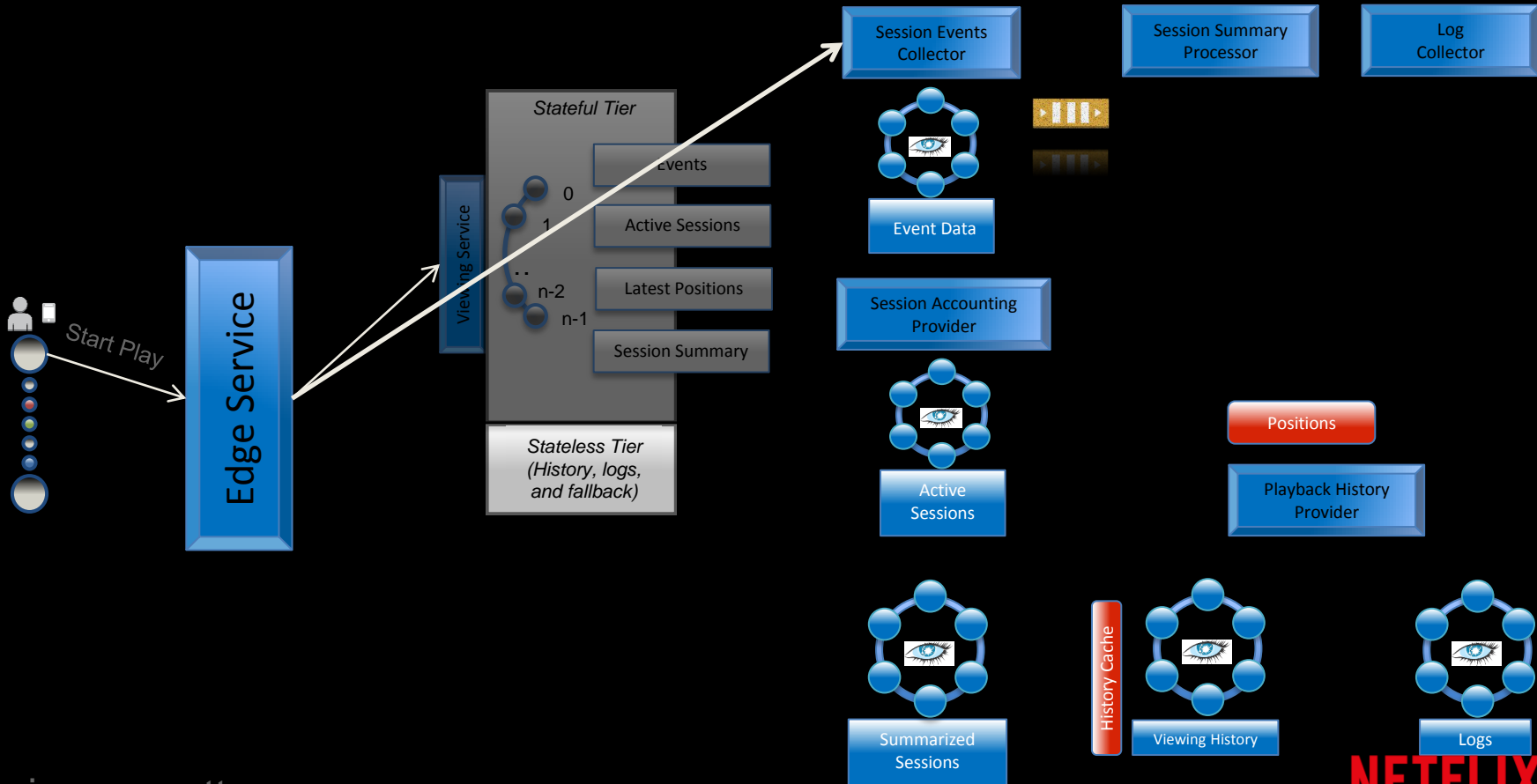
Edge Service



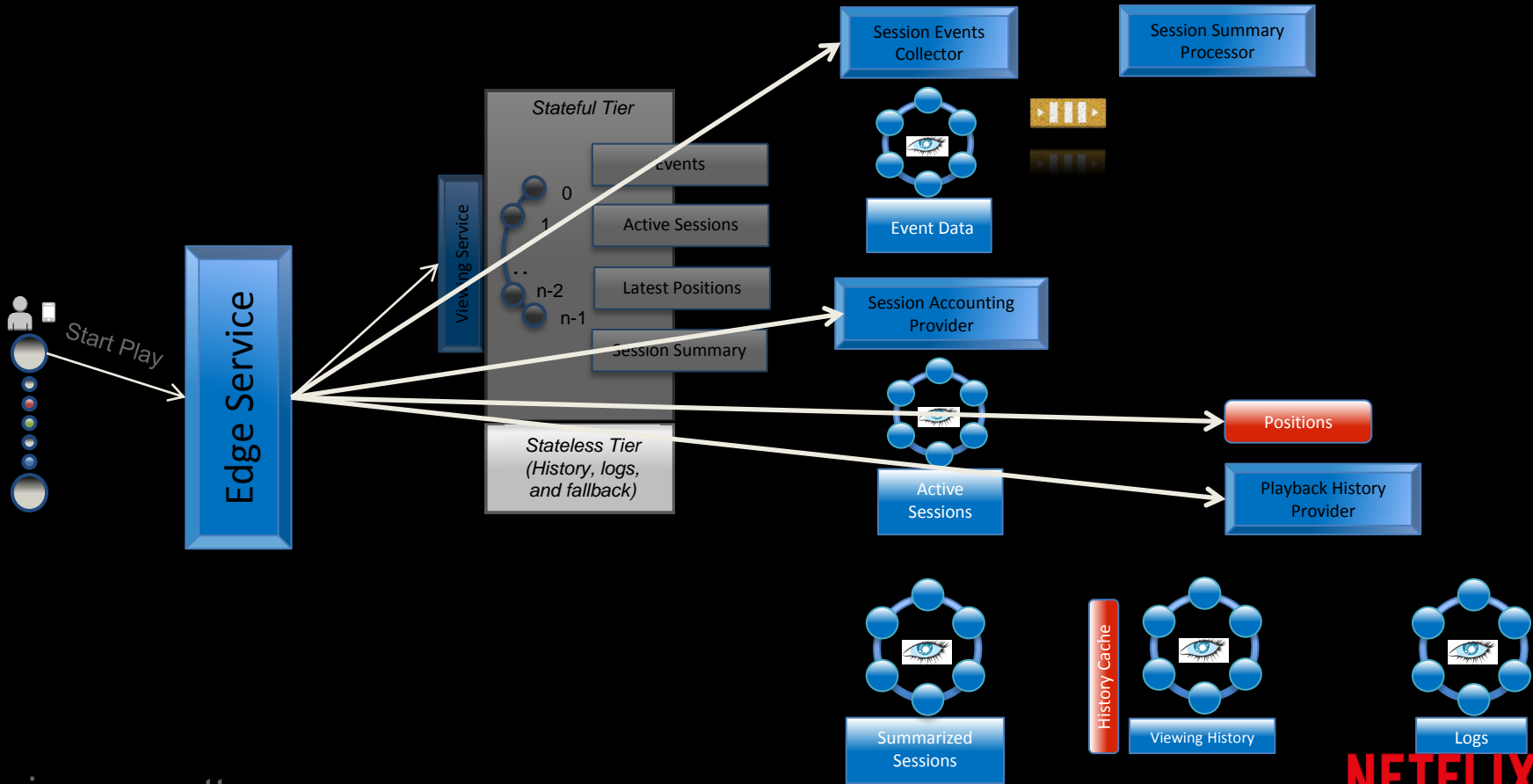
Traffic Dial



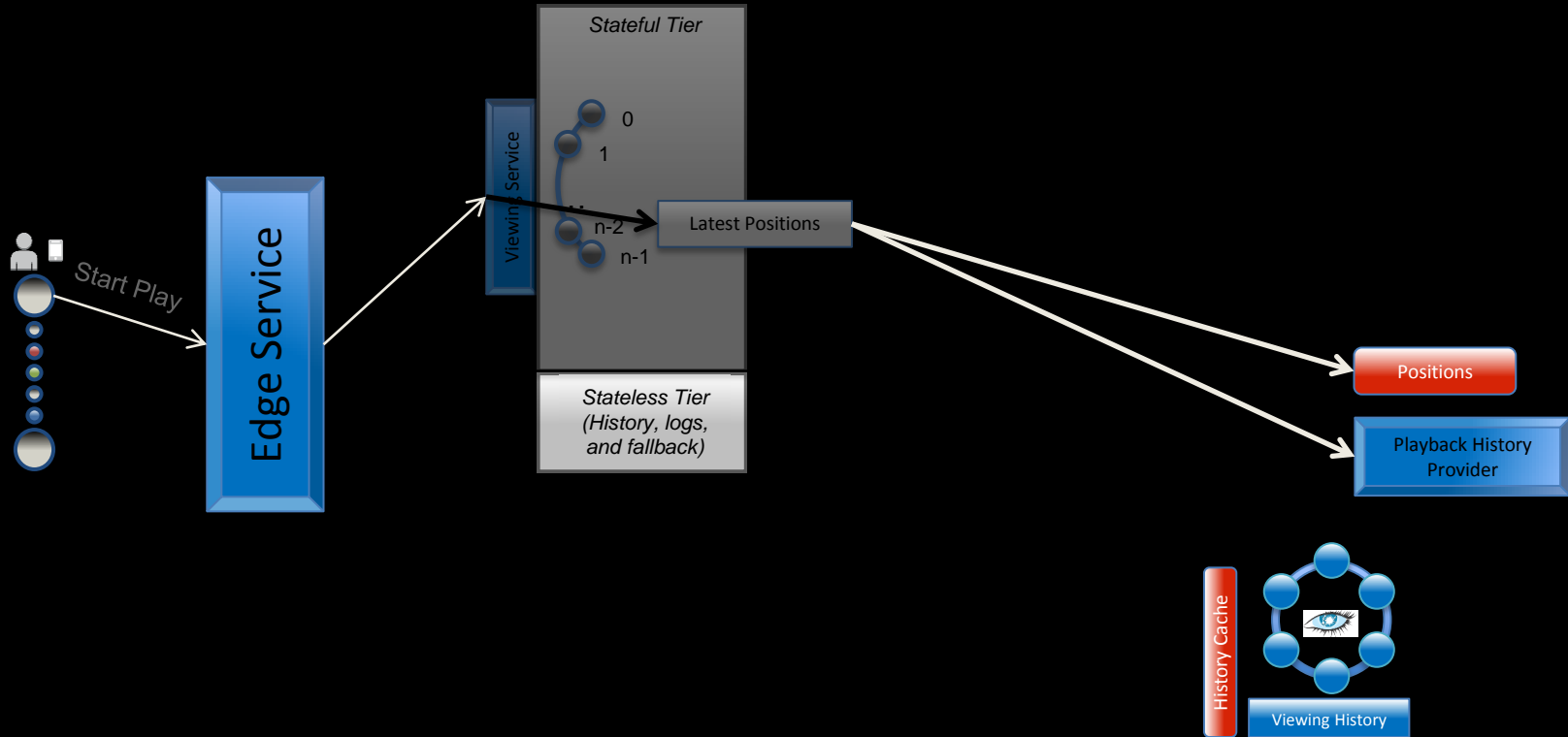
Traffic Dial



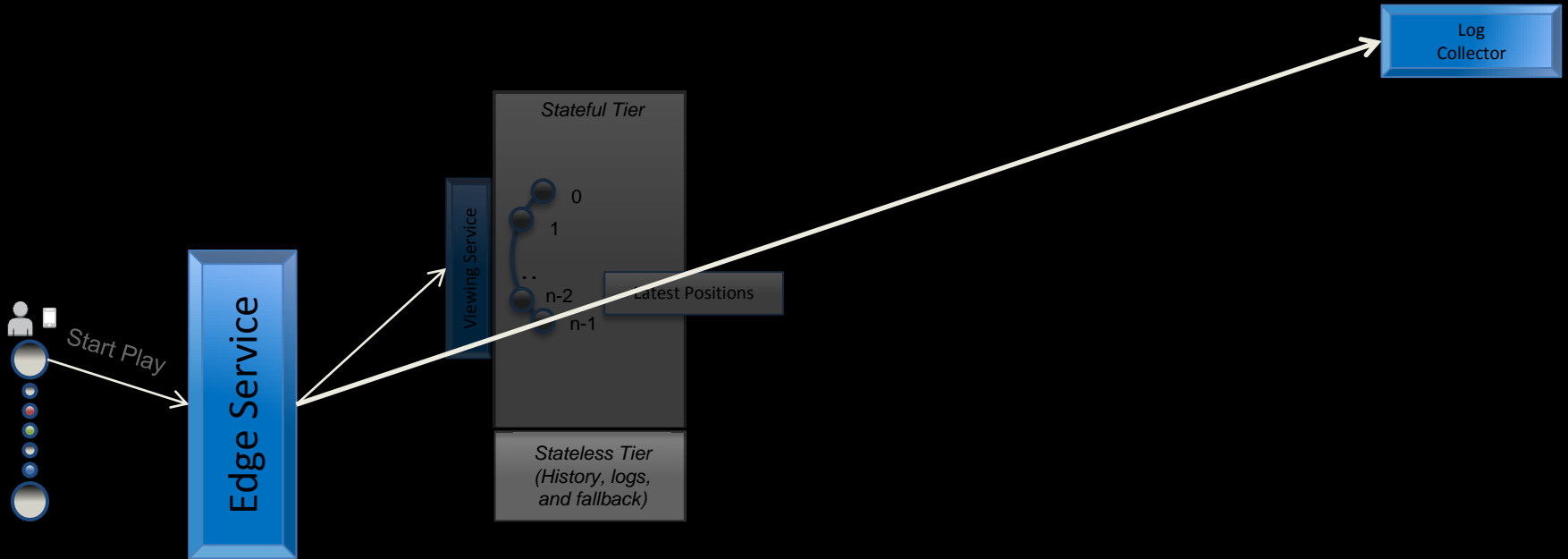
Traffic Dial



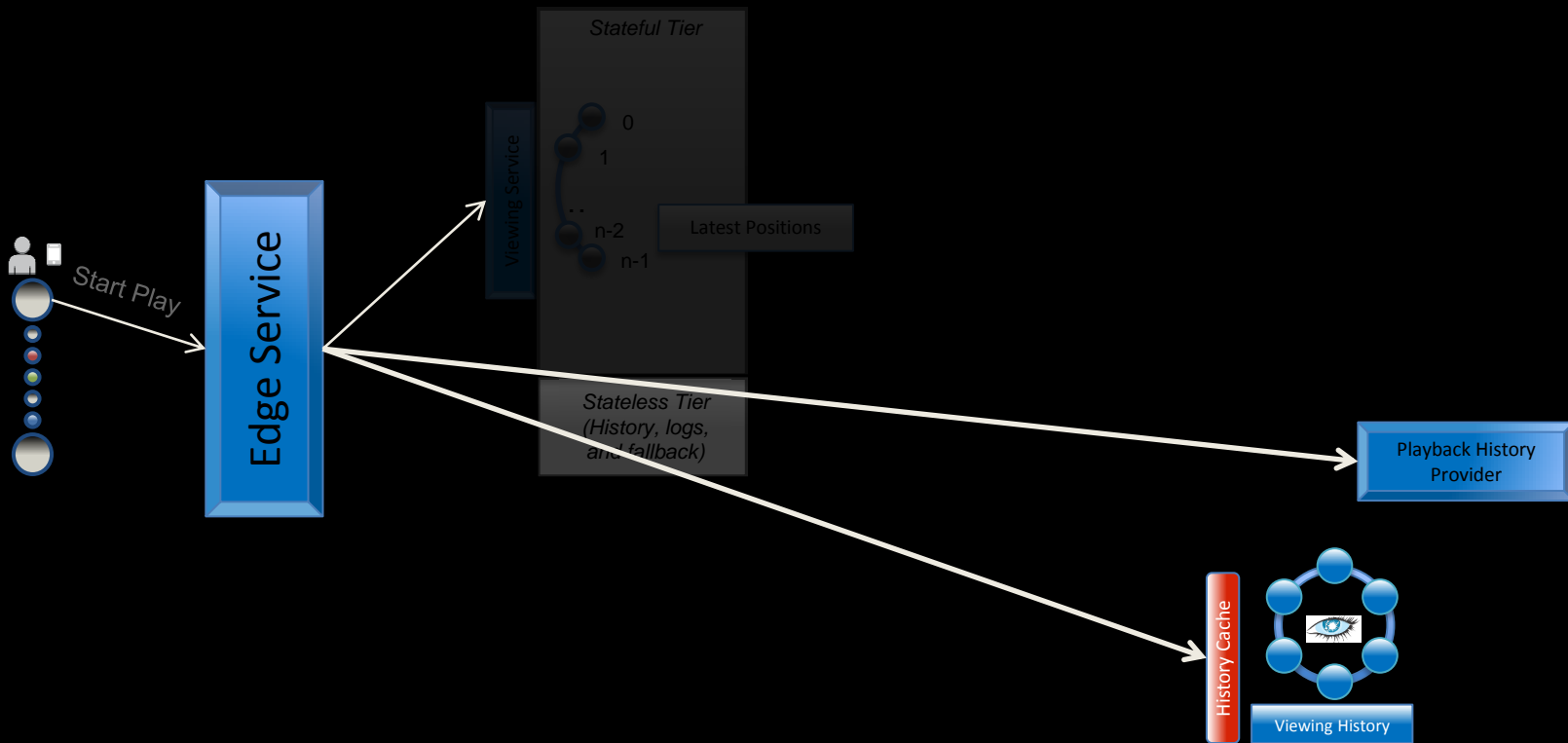
Traffic Dial



Traffic Dial



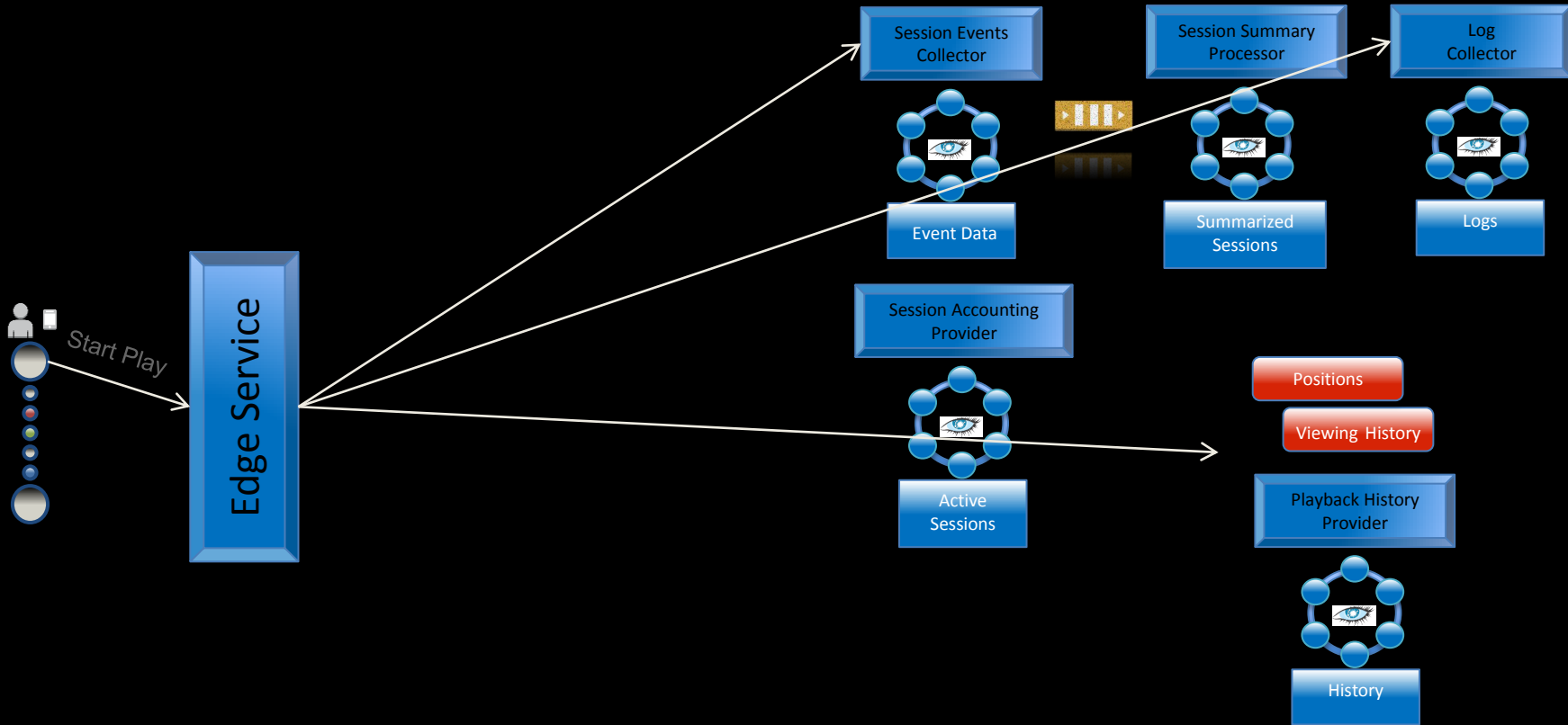
Traffic Dial



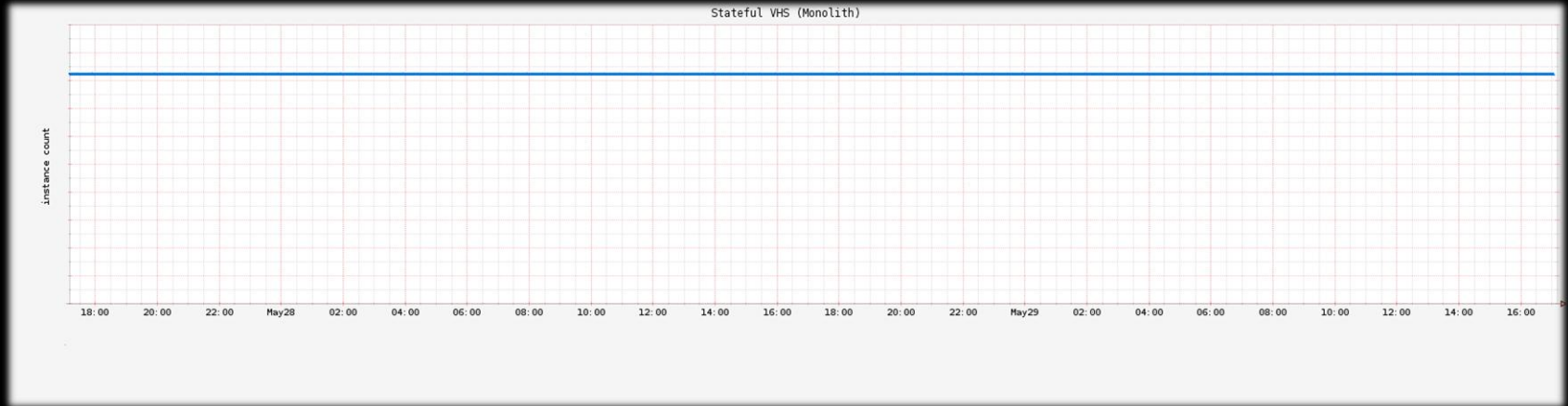
15



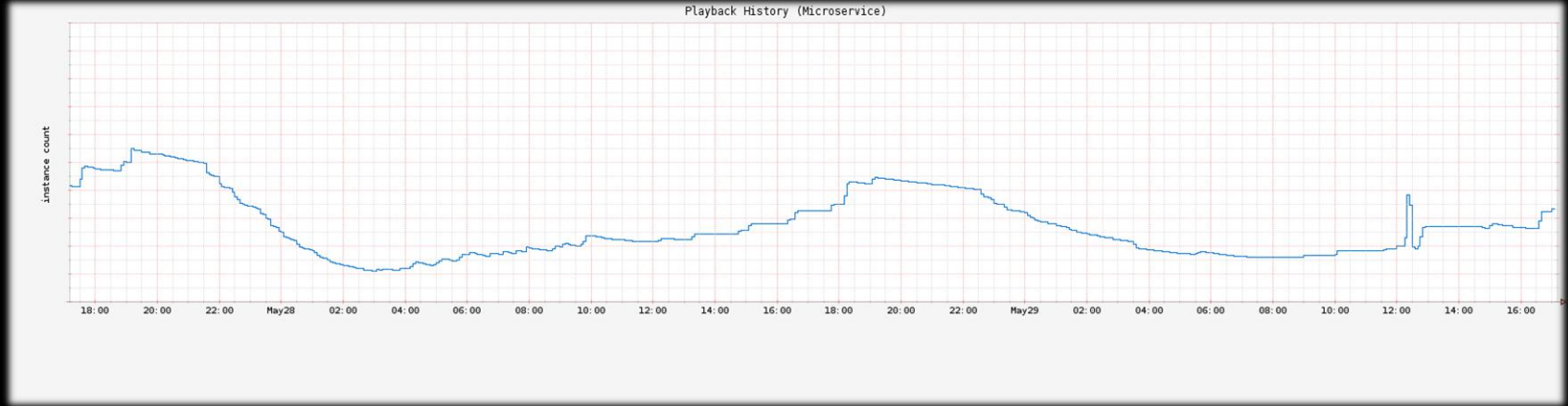
Migration Status



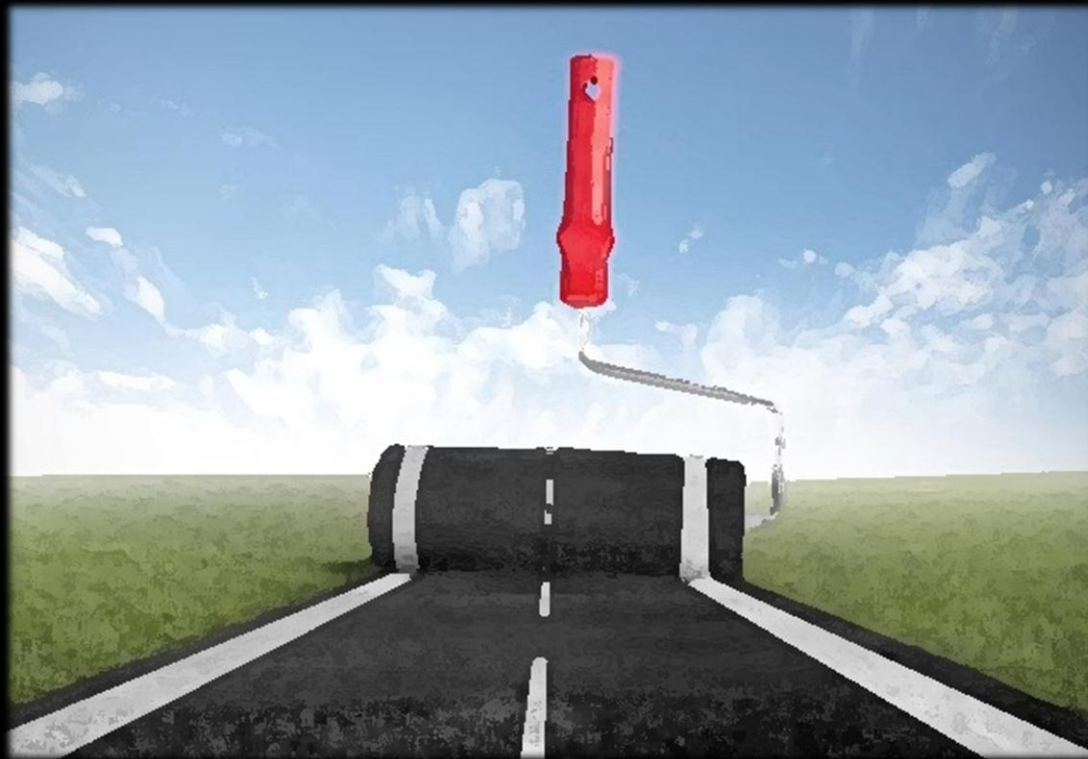
Remember this?



This is a typical graph now...



The Road Ahead



Key Points

- Devour the whale a bite at a time.
- Use CQRS / Event Sourcing. Backup the raw event data. Design for idempotency so it can be replayed.
- System architectures are throw-away artifacts, useful for only a limited time.

44m  49m

“If you don’t like how the table is set, turn over the table.”

Frank Underwood

49m  49m